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JULY TO DECEMBER, 1920  
WITH 24 PLATES AND 56 TEXT FIGURES



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# THE PHILIPPINE JOURNAL OF SCIENCE

VOL. 17

JULY, 1920

No. 1

PROCEEDINGS OF THE JOINT ANNUAL MEETING OF  
THE PHILIPPINE ISLANDS MEDICAL ASSOCIATION  
AND THE MANILA MEDICAL SOCIETY, HELD AT  
THE AMPHITHEATER OF THE COLLEGE OF MED-  
ICINE AND SURGERY, FEBRUARY 2, 3, 4, AND 5,  
1920

MINUTES OF THE ANNUAL BUSINESS MEETING OF THE PHIL-  
IPPINE ISLANDS MEDICAL ASSOCIATION HELD FEBRUARY  
5, 1920

The meeting was called to order by Pres. Harry E. Stafford at 3.35 p. m., after the close of the last scientific session, February 5, 1920.

1. The minutes of the last meeting of the Association held June 12, 1919, were read and approved.
2. The chair appointed Drs. Calderon, de la Paz, and A. Garcia, a Committee on nomination for the annual election of officers of the Association.
3. The report of the Secretary-Treasurer of the Philippine Islands Medical Association was received. This report was entirely negative as there were no moneys received and no expenditures made.

4. Reports of the Standing Committee were called:
  - a. The report of the Scientific Committee was rendered by Dr. Stafford, the Chairman. It was embodied in the program of the Association rendered.
  - b. The report of the Committee of Public Policy and Legislation was rendered by Dr. Angeles, Chairman. It consisted of the resolution to be presented to the Legislature regarding the petition for legislation prohibiting advanced pregnant women from engaging in work and professional engagements and providing for them proper nourishment. On motion of Dr.

Wade, it was decided to take up this resolution with other similar topics under the heading of new business.

- c. Report of the Committee of Publication rendered by Dr. A. Garcia. It consisted in the satisfactory negotiations with the Director of the Bureau of Science regarding the issue of one separate pamphlet embodying the proceedings of the Annual meeting and the publication of the different papers in a regular number of the Philippine Journal of Science, all under the same arrangement between the Manila Medical Society and that Journal.
- d. The Committee on arrangements rendered a report of progress, though the Chairman stated that it was not yet possible to render a complete report due to still unfinished arrangements.

All these reports were approved.

5. Unfinished business:

- a. The letter of the Secretary of the American Society for the Control of Cancer regarding a Cancer Committee in the Islands was read and the Chairman appointed Drs. Wade, Schöbl, and Gomez, Cancer Committee of the Association.
  - b. The letter of the Secretary of the V Asamblea Regional inviting coöperation of the Philippine Islands Medical Association was also read, and it was decided to give this Association's support.
  - c. The establishment of provincial branch societies was discussed. A committee composed of Drs. Calderon, de la Paz, Wade, and the Director of the Philippine Health Service was appointed to study the possibilities of the problem.
6. Dr. Saito of Japan requested permission of the Chair to read a paper on coöperation with the Far Eastern Association for Tropical Medicine. On motion of Dr. Wade, it was decided to let the Japan Medical Association take the initiative and that our Society will afterwards coöperate.

7. Dr. de la Paz, chairman of the Nominating Committee reported nominations as follows:

For President:	Dr. H. E. Stafford.
For 1st Vice-President:	Dr. Carmelo Reyes.
For 2d Vice-President:	Dr. Otto Schöbl.
For Councilor for five years:	Dr. Liborio Gomez.

On motion of Dr. Wade it was decided to cast the unanimous ballot of the Society for the names submitted by the Committee, and they were declared duly elected.

8. New business.

On motion of Dr. Garcia it was decided to express the Association's vote of thanks to all the entities and individuals who contributed with scientific articles and exhibited products at the meeting; also to those nonmembers who contributed papers

for the scientific program, and to the Dean of the College of Medicine and Surgery for the use of the Hall.

9. Adjournment was approved, 4.30 p. m.

ARTURO GARCIA,  
Secretary-Treasurer,  
*Philippine Islands Medical Association.*

The following resolutions were offered and a copy of each was sent to the Governor-General, to the President of the Philippine Senate, and to the Speaker of the House of Representatives.

**RESOLUTION RECOMMENDING THE ESTABLISHMENT OF REGIONAL  
GENERAL HOSPITALS IN THE PHILIPPINE ISLANDS**

WHEREAS, it is the belief of the Philippine Islands Medical Association, that one of the most effective measures that can be established for the preservation of life and improvement of health, in the Philippines, and particularly that of children is the establishment at selected provincial points, of general hospitals. These should be provided with special equipment for the clinical and laboratory examination of children and for their care when sick, about which the activities of the Philippine Health Service, La Liga Nacional para la Protección de la Primera Infancia and other entities may center; therefore be it,

RESOLVED, that the Philippine Islands Medical Association heartily endorse the plan proposed by Dr. Fernando Calderon for the establishment of eight such hospitals in the islands, and be it further,

RESOLVED, that the Philippine Legislature be respectfully urged to provide funds necessary for the carrying out of such a plan.

The above resolution was passed by the Philippine Islands Medical Association at its Annual Meeting, February 5, 1920.

ARTURO GARCIA,  
Secretary-Treasurer,  
*Philippine Islands Medical Association.*

**RESOLUTION RECOMMENDING THE CREATION OF A SEPARATE  
DEPARTMENT OF HEALTH AND CHARITIES IN THE  
GOVERNMENT OF THE PHILIPPINE ISLANDS**

WHEREAS, it is the sense of the Philippine Islands Medical Association and the Manila Medical Society in joint meeting assembled, that the present conditions of the government activities pertaining to health, sanitation and charities involve duplication of labor and expense as well as hinder the efficiency thru the fact that the said agencies concerned in these activities are dispersed over at least three different departments;

WHEREAS, one department under one Cabinet Head who being a medical man and one particularly acquainted with all the needs and principles involved in the proper management of the various agencies of a modern health administration could bring about as near ideal coördination and

efficiency as possible in this most important branch of government as far as national progress and development of the entire country is concerned;

WHEREAS, it appears, that this step would be in accordance with modern ideals of health and welfare service as demonstrated by institutions of similar character either already existing or recently innovated in other progressive countries such as England, Canada and Egypt, therefore be it,

RESOLVED, that the Philippine Islands Medical Association and the Manila Medical Society recommend to the Philippine Legislature that the necessary steps be taken tending to secure the establishment of a separate Department of Health and Charities, which would exert full control over all branches and divisions of government pertaining to health sanitation hospitals and charities which are now scattered over various government departments.

The above resolution was passed by the Philippine Islands Medical Association and the Manila Medical Society at their joint Annual Meeting, February 5, 1920.

ARTURO GARCIA,  
*Secretary-Treasurer,*  
*Philippine Islands Medical Association.*

**RESOLUTION RECOMMENDING THE ESTABLISHMENT OF NEW SEPARATE INSULAR HOSPITALS FOR DANGEROUS COMMUNICABLE DISEASES AND FOR INSANE AND CHRONIC INVALIDS  
IN THE CITY OF MANILA**

WHEREAS, it is the sense of the Philippine Islands Medical Association that the present conditions at the San Lazaro Hospital are unsatisfactory, in that;

1. In spite of the recent addition of one new building to the Department for Contagious Diseases, the provisions for cases of such diseases, are still inadequate for the emergencies that may arise in time of epidemics;

2. The Insane and those ill of dangerous communicable diseases, are housed in close proximity with the result that the former are continually excited by the activities inside and outside of the hospital and the latter are unduly annoyed by the noises made by the insane;

3. The Insane and the old chronic invalids who are permanently confined there, are exposed to infection, and furthermore their maintenance at San Lazaro is an unnecessary duplication of labor and expense inasmuch as the City of Manila is already maintaining separate similar institutions with which these sections of San Lazaro Hospital could very well be combined;

4. One building and a portion of the grounds are occupied by the College of Veterinary Science for the corrals and hospital for the treatment of diseases of animals;

5. The facilities for the proper care of the dead, for the performance of postmortem examination and for the carrying on of many laboratory tests necessary for diagnosis and control of treatment are inadequate;

6. The present site of San Lazaro Hospital is undesirable and unsuitable for either an infectious hospital or an asylum for the insane, because of its location in a section of town which is bound to become a congested residential or business section of Manila, as already evidenced by the existence of two large schools in its vicinity, and the opening and proposed extension of Avenida Rizal;

WHEREAS, these conditions are not only undesirable in themselves but cause the public to be strongly prejudiced against the institution with resulting active antagonism to the enforcement of measures of isolation so necessary for the control of epidemics of dangerous communicable diseases, therefore be it

RESOLVED: That the Philippine Legislature be petitioned to authorize the sale of the property of San Lazaro Hospital and thereby secure sufficient funds to establish one asylum wherein the Insular and City Asylums for the Insane and Chronic invalids may be taken care of, and separate from this, a modern hospital for dangerous communicable diseases in some more suitable location, the size of said hospital, to be commensurate with the increasing population of Manila and vicinity; and in case that such a sale may not be practicable, that funds be provided for the erection of one modern hospital for cases of dangerous communicable diseases in another locality, consolidating and combining in the present San Lazaro Hospital the City and Insular Asylums for insane and chronic invalids, and removing the Hospital of the Veterinary College elsewhere.

The above resolution was passed by the Philippine Islands Medical Association at its Annual Meeting of February 5, 1920.

ARTURO GARCIA,  
*Secretary-Treasurer,*  
*Philippine Islands Medical Association.*

A further resolution was offered, a copy of which was sent to the Mayor of the City of Manila, and another copy to the Chief of Police, as follows:

**RESOLUTION INDORSING THE ENFORCEMENT OF THE SPITTING LAW  
AND RECOMMENDING IMPROVEMENT OF THE SPRINKLING  
OF STREETS OF THE CITY OF MANILA**

WHEREAS, promiscuous spitting is not only extremely offensive, but is a most important means of spread of numerous infections of the respiratory tract, the most important of which is pulmonary tuberculosis, therefore be it

RESOLVED, that the Philippine Islands Medical Association heartily endorses the recent efforts of the Department of Police of the City of Manila to enforce existing laws respecting this nuisance and urges that the campaign be continued, and all efforts be made to improve the street sprinkling service in Manila, and be it further

RESOLVED, that the Philippine Islands Medical Association recommends that a special, active, and sustained educational campaign be undertaken by the Philippine Health Service in this connection.

The above resolution was passed by the Philippine Islands Medical Association at its Annual Meeting, February 5, 1920.

ARTURO GARCIA,  
*Secretary-Treasurer,*  
*Philippine Islands Medical Association.*

**SCIENTIFIC PROGRAM**

The following is a list of the papers that were read and discussed, many of which are here reproduced in toto. Where a title is marked with \*, it indicates that the paper is not reproduced; where a title is marked with \*\*, it indicates that the paper has been published in a previous issue of the Philippine Journal of Science.

MONDAY, FEBRUARY 2, 1920, 4.15 P. M.

**COLLEGE OF MEDICINE AND SURGERY**

- \* Opening Address, by His Excellency Francis Burton Harrison, Governor-General of the Philippine Islands.
- The Military Surgeon and the Civilian Practitioner, by Col. W. B. Banister, Medical Corps, U. S. Army.
- \* Presidential Address, by Dr. Harry E. Stafford, President, Philippine Islands Medical Association.

TUESDAY, FEBRUARY 3, 1920, MORNING SESSION, 9.00 A. M.

**COLLEGE OF MEDICINE AND SURGERY**

- Obstetrics and its Relation to Infantile Mortality, by Dr. Calderon.
- Clinical Analysis of One Hundred Cases of Enterocolitis with Especial Reference to Edema, Dehydration, and Putrid Odor of Stools, by Drs. Albert and Horilleno.
- \*\* Some Observations on Intestinal Parasites Found in Filipino Children, by Prof. Haughwout and Dr. Horilleno.
- \* Clinico-Pathological Conference, by Drs. Sison and Wade.

AFTERNOON SESSION, 2.00 P. M.

**COLLEGE OF MEDICINE AND SURGERY**

- \* The Present Status of Anti-Cholera Vaccination, by Drs. Bantug, Schöbl, and Gabriel.
- The Complement Fixation Test for Syphilis: Incubation for Fixation at Ice-box Temperatures, by First Lieut. Joseph W. Smith, Jr., Medical Corps, U. S. Army.
- Diphtheria in the Philippine Islands, by Drs. Gomez, Kapauan, and Gavino.
- The Physician and the Laboratory, by Maj. J. E. Ash, Medical Corps, U. S. Army.
- Note on the Keeping Qualities of Dried and Pulverized Vaccine Virus, by Dr. Schöbl.
- Venom of the Philippine Cobra (Alupong) *Naja naja philippinensis*, by Drs. Monserrat, Schöbl, and Guerrero.

WEDNESDAY, FEBRUARY 4, 1920, MORNING SESSION, 8.00 A. M.

PHILIPPINE GENERAL HOSPITAL

- \* Radium Conference, by Dr. Fernandez.
- \* Surgical Clinics, by Drs. Guazon and staff.

AFTERNOON SESSION, 2.00 P. M.

COLLEGE OF MEDICINE AND SURGERY

- \* The First Hours of a Wounded Soldier in the Great War, by Dr. Basilio J. Valdez.
- Clinical Forms of Panophthalmitis Observed in the Philippine General Hospital, by Dr. Ubaldo.
- \* Infant Mortality of the City of Manila during the Last Four Years, by Dr. Arenas, Philippine Health Service.
- Corneal Paracentesis, by Dr. Velarde.
- \* Epidemiologic Problems in the Mountain Province, by Dr. G. Intengan, Philippine Health Service.
- \* New Ideas in Public Health, by Dr. Laygo, Philippine Health Service.

THURSDAY, FEBRUARY 5, 1920, MORNING SESSION, 9.00 A. M.

COLLEGE OF MEDICINE AND SURGERY

- A Case of Pollakiuria immediately relieved by External Liberation of the Pelvic and Iliac Portions of the Ureter, by Dr. Eduque.
- Informal Presentation of two Urological Cases: One a Diverticulum of the Bladder and One a Left Renal Calculus Complicated by Pyelitis, by Capt. Ivy A. Pelzman, Medical Corps, U. S. Army.
- \* Report of a Case of Actinomycosis of the Lungs, by Dr. Hilario Streptococcus Hemolyticus: a Case Study, by First Lieut. Harry G. Johnson, Medical Corps, U. S. Army.
- \* Lysis of the Oesophagus, with Intrapleural Haemorrhage, In Streptococcus Septicemia, by Dr. Wade.
- \* Frequency of the Presence of the Cholera Vibrio in the Bile of Cholera Patients, by Dr. Tobillo, Philippine Health Service.
- Clinical Studies on Encephalitis Lethargica, by Drs. Lantin and Vitug.

AFTERNOON SESSION, 2.00 P. M.

COLLEGE OF MEDICINE AND SURGERY

- Xerophthalmia in Fowls Fed on Polished Rice and its clinical importance, by Drs. Guerrero and Concepcion.
- The Dunham Fan in Roentgenograms, by First Lieut. Paul S. Seabold, Medical Corps, U. S. Army.
- The Disease-Carrier Problem in the Philippine Islands, by Dr. Concha Brillantes.
- Auto-infection, So-called, during the Puerperium, by Dr. Rustia.
- Pathological Findings in three Cases of Encephalitis Lethargica, by Dr. W. de Leon.

BUSINESS MEETING, BANQUET, 7.30 P. M.

- \* Closing Address, by Dr. Fernando Calderon, President, Manila Medical Society.

## MEMBERS

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## THE MILITARY SURGEON AND THE CIVILIAN PRACTITIONER

By Col. W. B. BANISTER  
*Medical Corps, United States Army*

MR. PRESIDENT and GENTLEMEN: When the President of this Society extended an invitation to the military surgeons of the Philippine Department to participate in its proceedings this year I was gratified, as I have long felt that the civilian practitioner and the military surgeon should be brought into closer touch and sympathy, and each acquire a more intimate knowledge of the particular line of development of the other, to our mutual advantage. I know of no better method of establishing a line of contact than the exchange of ideas in a general meeting of the medical profession of these Islands, such as this.

These introductory remarks would lead to the inference that the civilian practitioner and the military surgeon have developed along different lines and, while I admit that their respective development presents many points of contact, I also claim it presents some lines of cleavage as well. The military surgeon has advanced particularly along the line of the etiology of disease with special reference to its bearing on preventive medicine, and the civilian practitioner in the direction of therapeutics, or the curative treatment of disease. This difference has arisen from the character of the responsibilities resting upon each, respectively. The senior surgeon of a military command is held officially responsible for the occurrence of epidemics in armies, and for not stamping out such epidemics when they begin, and at least must show that all the scientific knowledge of his day has been utilized, and if that is not sufficient he is expected to get more scientific knowledge. The principle involved is to get as many bayonets as possible to the battlefield; and, however fine the curative treatment may be, a sick soldier cannot fight, and so becomes a liability rather than an asset. Soldiers are associated together so intimately and in such numbers that armies are peculiarly susceptible to epidemic diseases, and many armies have been defeated by disease rather than by the efforts of their enemies. Brennus undoubtedly would have taken the Capitol

at Rome if his army had not been decimated by malarial fever. In the year 208 A. D. the Roman Army in Scotland lost 50,000 out of a total of 80,000 from malarial fever. The expedition in 1740 of English and American Provincial troops against Cartagena failed because of the prevalence of yellow fever in the expeditionary force. Benedict Arnold would undoubtedly have surprised and captured Quebec, Canada, in 1775 but for the occurrence of smallpox in his command during the march through Maine, and thus would have added Canada to the present United States. In 1898, during and after the operations of the Fifth Army Corps against Santiago de Cuba, half of our forces in Cuba were incapacitated for duty by malarial fever.

These are but a few of the many instances that could be quoted to "point a moral or adorn a tale," not to mention the 70,000 cases of typhoid fever in the Prussian Campaign in the Franco-Prussian War of 1870, the 50,000 cases in the English Army in the War in South Africa, and the 20,000 cases that occurred in the United States Army in the Spanish-American War in 1898. It is such experiences as these that have forced the military surgeon to develop along the lines indicated. It may be stated that the diseases that have caused the greatest ravages in modern armies are malarial fever, typhoid fever, yellow fever, and venereal diseases. The plasmodium of malaria was discovered in the red blood corpuscles of malarial patients by Alphonse Laveran, a surgeon in the French Army in Algiers in 1880. Ronald Ross, a surgeon in the English army in India, demonstrated the infection of birds by the bite of the mosquito in 1897-98. The fact that the anopheles mosquito only infected human beings with malaria was demonstrated by Grassi and A. Bignomi in 1899. Charles F. Craig, a military surgeon in the United States Army, demonstrated the possibility of malarial carriers in 1907. Knowing the etiology of malarial fever and its transmission by the anopheles mosquito, the principles involved are simple, namely: keep the men protected from mosquitoes, destroy mosquitoes, and treat carriers so they will cease being carriers and infecting more mosquitoes. From 6,000,000 to 7,000,000 cases of malaria occur annually in the United States. In the military camps only 220 cases were reported among the 4,000,000 men called out.

With regard to typhoid fever, the first work along the present lines among English-speaking people was done by Sir Almworth Wright, a surgeon in the British Army, and in South Africa during the Boer war. The results were, for several reasons,

not brilliant. The system worked up for the United States Army by Colonel Russell of our Medical Department has produced brilliant results, and has made typhoid fever almost a negligible item in our morbidity lists. This consists in the injection of 500 million killed bodies of the typhoid bacillus, hypodermically, and of two additional doses, at seven-day intervals, of one billion each. During the World War, in the entire army of the United States in 1917-1918, 1,083 cases of typhoid fever occurred with 158 deaths. If the rate had been the same as for 1898-1899, during the Spanish-American War, when no typhoid prophylaxis was used as at present, the number of cases would have been 291,637 with 30,916 deaths. This method of typhoid prophylaxis could be used by the civilian practitioner to prevent typhoid fever among the civilian population with better prospects of success than in the army, because most cities have sewer systems with water carriage, and many other sanitary advantages. The military surgeon has been using typhoid prophylaxis since 1909 on volunteers, and since 1911 it has been compulsory in the army.

The United States has suffered very severely from yellow fever epidemics, originating principally in Havana, Cuba (and with enormous economic loss), where it has been known to have existed since 1648. Nearly all the epidemics in the southern United States have been traced to Havana. The French were unable to build the Panama Canal because of the ravages of malarial and yellow fever, principally the latter, among the laborers. In 1900, during the American occupation of Cuba, a board of military surgeons of the United States Army, headed by Maj. Walter Reed, demonstrated the method of transmission of yellow fever by the *Stegomyia calopus* mosquito. With this knowledge General Gorgas, a surgeon of the United States Army, attacked the disease in its favorite lair, first in Havana, and eliminated it after it had prevailed there for over 300 years; then with equal success in Panama; and recent reports show that it has been abolished in Guayaquil, Ecuador, its last stronghold, and is now nonexistent on this mundane sphere. The cardinal idea in conquering this disease was to attack it in its lair, and not waste time and money on its outposts.

It was the military surgeons of Japan who first demonstrated that beriberi was a disease due to defects of nutrition. By adding more vitamines to the diet, which consisted principally of fish and rice, it was eliminated from the Japanese Navy. As late as 1883, 23 per cent of the Japanese Navy had beriberi.

During the Russo-Japanese war, 200,000 cases of beriberi occurred in the Japanese Army. Beriberi prevailed extensively among the Philippine Scouts. As late as 1909 nearly 104 per thousand of the Scouts had beriberi. By 1910 the army surgeons on duty with the Philippine Scouts had eliminated beriberi by a change of dietary, in part by the use of undermilled rice.

The incidence of venereal disease in the army has been reduced to one-third of its former prevalence. How? By prophylactic stations ready of access to all soldiers exposed to infection; by lectures to soldiers by medical officers; appeals by posters and by moving-picture shows used as illustrated lectures. We first try to educate the soldier to coöperate with us in preventing venereal disease and, when this fails, by court-martial if he fails to use the prophylactic means provided, and by depriving him of all pay while on sick report from venereal disease. The civilian practitioner may smile and say: "Yes, we know the soldiers have lots, but what has that to do with us?" Well! Statistics of the World War show that 96 per cent of the venereal disease in the army was contracted prior to entry into the military service. If civilian practitioners, as represented by boards of health, etc., would employ methods similar to those of the military surgeons, and we could eliminate that 96 per cent we get from civil life, maybe, I will not say positively, but maybe we could eliminate venereal disease in the army as we did in great part malarial fever, typhoid fever, yellow fever, and beriberi.

Venereal diseases, gentlemen, are a more serious menace to health and happiness among the civilians of present-day civilization than all the other diseases mentioned. Civilian communities have never made any other than desultory and ineffective efforts to rid themselves of venereal infections. The army Medical Department has shown the way. Will the civilian practitioners as a body avail themselves of these proven methods?

The advance of the civilian practitioner in curative medicine is illustrated by the introduction of diphtheria antitoxin, which has saved hundreds of thousands of lives; by Flexner's serum for cerebro-spinal meningitis; by Pasteur's treatment for hydrophobia infection, and so on. While the military surgeon has shown great eagerness to adopt the curative methods introduced by the civilian practitioner, the latter has not shown the same

readiness to adopt the preventive methods of the military surgeon, such as typhoid and venereal prophylaxis.

Then came the World War, and the civilian practitioner covered himself with glory through his patriotism in rallying to the flag and his scientific medical knowledge. Prior to April 6, 1917, the regular army had but 447 medical officers, and 1,600 reserve officers who were in civil life. During the war period 35,000 civilian practitioners joined the colors, and about 20,000 served as medical officers of the draft boards in making physical examinations. Over 14,000, the cream of the medical profession in the United States, served in France; and never before in history, with the combination of both the military surgeon and the civilian practitioner, have the soldiers of armies been so well taken care of, both in the prevention of disease and in its cure, and under such unfavorable conditions as prolonged trench warfare. It is true war claimed its millions in dead and disabled, but they were the legitimate losses of war, from shot and shell and gas.

The control of smallpox and typhoid, the two great scourges of armies, was almost absolute. Typhus fever was held in abeyance in armies fighting in Europe by the discovery that the body louse is the transmitter of that disease, and by the extensive system of delousing the armies employed back of the lines; tetanus, by antitetanic serum which was required by orders to be administered to all wounded at the first practicable point, and each wounded man's field card showed where and when it was administered. The infection of wounds by the gas bacillus was prevented to a great extent by the debridement operation, which consisted of laying open the wound freely, and removing all dead or devitalized tissue, including muscle, bone, tendons—in fact, every dead tissue—and removal of all foreign bodies. Unless this was done the dreaded gas infection was very apt to occur. Then there was the Carrell-Dakin treatment of wounds, in which the open wounds were lightly packed with gauze, and kept wet with the Carrell-Dakin solution until the fixed hospital was reached. Then, by frequent cultures made from the discharges from the wound, it was found that, when the organisms had been reduced to a certain number per field of the microscope, the wound could be sutured with confidence that it would then heal by first intention. This treatment saved many lives and prevented much disability. The louse was found to be the cause not only of typhus fever but also of trench fever.



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Prior to the war, fifty Red Cross base hospitals were organized in the United States, composed of the élite of the medical profession in the States. These hospitals were the backbone of our hospital system in France, and rendered brilliant service. The medical officers of these hospitals were composed of civilian practitioners with usually a regular army medical officer in command. These and all base hospitals were grouped in what is known as a Hospital Center. A man severely wounded at the front received first aid and antitetanic serum, and was passed back through the regimental aid station, dressing station, and field hospitals to the evacuation hospitals by motor transport. From the evacuation hospitals, which were usually at a rail head, he was taken to a base hospital of a Hospital Center by hospital railroad trains.

One important function of the Medical Department in France was the retention of man power in the theatre of war. Each base hospital had organized a disability board which classified all wounded at that hospital in one of four classes, "A", "B", "C", "D". "A" cases were men who had recovered and were fit for combat duty at the front; "B" cases, not fit for combat duty but rather heavy work in the Service of Supply—that is, in the rear of the battle front; "C" cases were those capable of only light work in the "S. O. S."; and "D" cases were entirely disabled, to be sent back to the homeland.

The Hospital Center was an entirely new idea in our service. It was commanded by a regular medical officer who, aided by a staff, provided the base hospitals in the Center with everything—food, clothes, transportation, medical supplies, laborers, butchers, sanitary squads composed of specially trained enlisted men—which left him to devote all his energies to the care of the sick. Being in command of a Hospital Center I had on my staff an Adjutant, four Quartermasters, an Evacuation Officer to evacuate arriving hospital trains, a R. T. O., a Zone Major, a Provost Marshall, a Medical Supply Officer, a Sanitary Officer, and a chief Laboratory Officer; and attached to Headquarters, an Ambulance Company, a Butcher Company, a Labor Company, and a Sanitary Squad. These hospitals varied from 1,000 to 3,000 beds each. You can understand the necessity of butchers to make an economical cutting of meats in a hospital of 3,000 beds. This Center took care of 9,000 patients at one time, and 23,000 patients passed through the Center from July 2, 1918, to February 1, 1919. A Hospital Center in France was then a

big business center to provide the large base hospitals therein with everything they needed.

Since the military surgeon and the civilian practitioner worked together with such brilliant results during the World War, and with ever-increasing mutual esteem and admiration and understanding, would it not be a pity for them to fall apart in time of peace and lose touch, and no longer regard each other as comrades as they learned to do during the World War? It is with the idea of preserving the entente cordiale that I said in the beginning of this lecture that I was gratified when the military surgeons were invited to participate in this meeting of the Philippine Islands Medical Association.

When the civilian practitioner of the Tropics exterminates tropical diseases such as cholera, malarial fever, tropical dysentery, and others, then man can again return unto his birthright. I hold it is a self-evident fact that the Tropics is the natural habitat of man. Before man invented fire and clothes, he could have lived nowhere else but in the Tropics. After these inventions he migrated to other zones, probably driven by tropical diseases which he could not control, to climate conditions where they did not prevail. The military surgeons have shown in Panama and Havana that the Tropics can be made as healthy as any other part of the world. It should be the aspiration of the medical profession of these Islands to make them as healthy as any other country. It is possible, because it has been done in other tropical places, and what man has done, man may do.

## OBSTETRICS AND ITS RELATION TO INFANTILE MORTALITY

By Dr. FERNANDO CALDERON

Puericulture has for its object the study and the practical application of all those measures which tend to protect the life of the product of conception during its first two years of existence; that is, during the most hazardous period in life, because every individual is at this time most exposed to the diseases that man is likely to pass through before he attains his full development.

Some authors distinguish four periods in the evolution or development of the child, and corresponding to these different epochs of life, puericulture is divided into prenatal, intranatal, neonatal, and postnatal. Prenatal puericulture deals with such measures as will safeguard the existence of the embryo from the time it is conceived until it grows into a viable fetus; intranatal puericulture aims to protect the life of the fetus during the brief but hazardous ordeal through which the pregnant woman must pass in order to deliver her child into the world; neonatal puericulture deals with the care of the newly born during the first four weeks of his life; postnatal puericulture aims to give the proper care to the infant from his fifth week of life until he attains his second year of age.

Pregnancy has long been held to be a normal process and, as such, demanded no special care of the mother or of her child. There is nothing that could be farther from the truth. The recent studies of Kellogg bear out this statement. Thus, among his 4,996 cases of pregnancy he found the following complications: Albuminuria, 361; high blood pressure, 259; definite symptoms of toxemia, 195; narrow pelvis of various grades, 401; cardiac lesions, 111; gonorrhea, 10; chronic nephritis, 5; diabetes, 3; fibroma of lower uterine segment, 30; making a total of 1,524 complicated pregnancies and representing approximately 30 per cent of the cases studied. These figures are significant, and they alone emphasize the necessity of a careful examination of every pregnant woman, to safeguard not only her own life but also that of her child, whose safety is so inti-

mately connected with that of the mother. Briefly summarized, this examination should include the following points:

*a.* Early and complete physical examination of the pregnant woman, especially of the heart, the lungs, the abdomen, and the blood pressure.

*b.* Pelvimetry and cephalometry before the eighth month in primipara in order to ascertain the size of the fetal head and the relative capacity of the birth canal.

*c.* Examination of the urine every four weeks during the first six months of pregnancy, and every two weeks, or oftener if necessary, thereafter.

*d.* Wassermann reaction in suspected cases.

*e.* Examination of the fetal presentation and auscultation of its heart sounds.

*f.* History of previous pregnancies and labors.

From the results of these different examinations one must decide the line of treatment adapted to each particular case, not only to combat whatever complication may endanger the life of the mother, but also to insure the birth of a sound baby.

Although it is not my intention here to present these different complications and their treatment, I might emphasize the fact that a good many abortions and fetal macerations of luetic origin could be averted if adequate treatment were instituted early.

Through intranatal care, which consists essentially of a proper conduct of labor, normal or otherwise, it will be possible to save many lives, for it is a well-known fact that, as macerated fetuses die on account of some disease of the placenta, retroplacental hemorrhages, chronic kidney diseases, syphilis, or other maternal diseases, fresh or nonmacerated fetuses are likewise prone to die on account of some accident of labor, traumatic or otherwise, such as placenta previa, accidental hemorrhages, umbilical prolapse, or unduly prolonged labor. This statement is borne out by the fact that more than half of the fresh fetuses that are delivered stillborn show lesions of cerebral hemorrhage and lacerations of the dura mater from excessive or prolonged pressure, injuries which a competent obstetrician might have easily prevented.

I shall not discuss here the different indications which the obstetrician must meet according to the different complications that may develop in every delivery, but I shall call your attention to the indication of premature delivery or Cesarean section in women with narrow pelvis. In these cases the fetuses, left

to the unaided forces of nature, are ordinarily delivered dead, when it would have been comparatively easy to save them by means of a premature delivery, or by a timely performance of a Cesarean section, according to the circumstances.

There exists an intimate relationship between prenatal, intranatal, and neonatal puericulture, as is shown by the fact that many fetuses which are sickly and weak at birth bear evidence of having become so while in the maternal cloister, either during pregnancy or during labor. Such happens, for instance, with the congenitally weak, or with those that present symptoms of meningitis secondary to a faulty application of the forceps or as a consequence of injuries sustained by the fetal head in the course of an unduly prolonged labor.

Such is not always the case, however, for a good many times the healthy infant contracts the disease during the first few weeks of his life. Such happens, for instance, in umbilical tetanus, a very serious and fatal infection which develops through the umbilical wound from criminal carelessness or negligence on the part of the attendant. This fatal infection has been completely eliminated in countries where the practice of modern obstetrics has become generalized among the masses; but unfortunately it is still rampant not only in the Philippines as a whole but in its very metropolis, Manila, where according to Professor Albert's investigations it is found that among the 30-day-old babies, 102 out of 110 infections that occurred in the city of Manila in 1913 died from tetanus; 94 out of 100 in 1914; 103 out of 110 in 1915; 96 out of 105 in 1916; 102 out of 108 in 1917.

The same thing is true of the purulent ophthalmia in the newly born, as a consequence of which several children become blind, a complication which is almost always preventable and is likewise attributable to the negligence of the attendant. Unfortunately it has not yet disappeared from the obstetrical annals of this country.

I shall not mention the diseases of the alimentary and respiratory tracts which are so frequent among infants before they reach their thirtieth day. It suffices to say that altogether too many die of such diseases at this age—a vulnerable age—which fact is in itself a strong justification for the spread of puericulture over the entire Philippine Archipelago.

The above remarks are sufficient to show that obstetrics is so intimately associated with prenatal, intranatal, and even neonatal puericulture that, if the obstetrician aims to fulfill the

double mission imposed upon him, to save the life of the mother and that of the fetus, he must familiarize himself with the secrets of puericulture in its relation to obstetrics. On the other hand, we must also admit that for the very reason that it is inconceivable to conduct any effective campaign against infant mortality without the help of puericulture, puericulture cannot be effective without the aid of obstetrics. For this reason, if it is desired to carry on a thorough campaign against infant mortality in this country, and at the same time establish puericulture centers, it is necessary to establish also well-organized maternity services which will serve as obstetrical centers, and centers for prenatal, intranatal, and even neonatal puericulture.

Such maternity services could be established in our towns in two different ways: one through visiting nurses and qualified midwives who shall be under a physician's supervision, in order that the patients will be cared for entirely at their homes; the other way would be by establishing hospital maternity departments with their corresponding out-patient service for certain cases. It is evident that the former plan would be cheaper but at the same time less effective and more exposed to failure. Cases of abnormal labor which might be encountered cannot of course be so well attended at the homes of the patients as at the hospital, especially when the conditions surrounding the homes of the patients, for the majority of whom the service is intended, are taken into consideration.

It goes without saying that in default of a hospital maternity service, with its out-patient service, the first plan should be tried, even if, on account of lack of proper personnel who could be trusted with the work, it could not be made at present as extensive as is necessary.

Imbued with these ideas and in my sincere desire to work for the benefit of the people, I took it upon myself to address an official communication to the Honorable the Secretary of the Interior on September 30, 1919, urging that, as a valuable contribution to the solution of the great problem of infant mortality in this country, steps be taken to carry out the provisions of Act 2801 whereby the construction of eight provincial hospitals is authorized, either simultaneously or one at a time, additional hospitals to be constructed and organized as fast as the resources of the Insular Treasury would permit it. These hospitals, which are an every-day need, should be provided with their corresponding maternity services, both hospital and outside. They are to be built of reënforced concrete and first-class timber, and

should cost approximately 200,000 pesos each, which would make a total of 1,600,000 pesos for the eight buildings.

It seems just and natural that the provinces that will be directly benefited by the provisions of the above act should contribute their share in the cost of erection and maintenance of these hospitals. They should be expected at least to donate the land on which the hospitals will be erected.

Taking the actual prices as the basis for our estimate, and adopting the Southern Islands Hospital at Cebu with its sixty-five to seventy patients daily as a type, the maintenance of each one of these proposed hospitals will be not less than 80,000 pesos, which would mean a drain of 640,000 pesos a year on the Insular Treasury.

It will not be difficult, however, to find a practical way of reducing each province's share in the cost of maintenance of these hospitals. In the first place, each provincial board could be asked to defray the expenses of conducting the corresponding respective dispensary, for it is evident that the patients the hospital will be called upon to treat will come from every nook and corner of the province. The out-patient maternity department, which at any rate is not expensive, should be paid for by the municipality, in as much as its benefits will be practically monopolized by the expectant mothers of the locality. In order that the hospital may have its own resources, which it will use for defraying part of the expenses of its own maintenance, it will be advisable to fix a reasonable scale of fees, sufficient to cover lodging, board, and ordinary medical assistance, to be paid by patients admitted to the hospital, with the exception of the very poor, to whom no charge whatever should be made.

This proposition is quite equitable, for it suits the local conditions as they obtain in the majority of our provinces where, as is well known, almost everybody owns his small piece of land, and can therefore afford to pay the reasonable hospital fees which will be demanded of him; but the very rich, among whom the service must necessarily be better, should be required to pay higher fees.

All the money derived from these different sources should be deposited in the provincial treasury and, together with whatever might be contributed by the province and the municipality, will doubtless go a long way toward supporting the hospital and obviating the necessity of its depending entirely upon the exhausted resources of the insular treasury. Through such an arrangement the latter will be called upon to cover only whatever

deficits may result. A plan similar to the one outlined above is already in operation in the Department of Mindanao and Sulu, and its ten general hospitals hardly cost the Insular Treasury 120,000 pesos a year.

Should this proposition meet with the approval of the authorities and be carried out, it would be advisable to amend Act 2801 in the sense of authorizing the installation of pay sections at the provincial hospitals for the benefit of the well-to-do classes. It would be manifestly unjust to the latter, who are naturally the heaviest taxpayers, to find themselves debarred from the hospital in case of personal sickness or sickness in their own families.

One of the drawbacks to any intensive campaign against infant mortality in this country is the woeful lack of trained personnel that could be trusted with the management of puericulture centers; it might be interesting to know that in the whole Philippines there are altogether not more than 969 practicing physicians, which gives the proportion of 1 physician to every 11,175 inhabitants, as against 1 to every 700 inhabitants in the United States.

This evident shortage of physicians is rendered more acute on account of their irregular distribution, there being in Manila alone not less than 250, while a similar condition prevails to a lesser extent in the smaller cities of Cebu, Iloilo, and Zamboanga, these cities also having a larger share of doctors than the surrounding country. The result of this disproportionate distribution is that, according to figures furnished by the Census Bureau, in many of our towns the number of those that died with any medical assistance at all barely reaches 8.4, and in some it is even as low as 3 per cent.

In order that the population of the Philippines may have a proportional number of physicians there should be a practicing physician for every 3,000 inhabitants, and a sanitary officer for every community of 10,000; in other words, the country is in need of not less than 3,609 clinicians and 1,082 sanitarians, a total of 4,691 instead of the 969 that can be depended on at present. Medicine as a profession is evidently not very attractive to our young men.

The disproportion is even more striking in the case of nurses, the records of the Board of Examiners for Nurses giving only 672 registered nurses, which would allow a nurse to every 16,114 inhabitants. It must be remembered, however, that nursing is a comparatively new calling in this country, the first graduate nurses having received their diplomas only nine years ago,

while medicine is one of the oldest learned professions in the country.

From the foregoing facts the following propositions are submitted:

1. An amendment to Act 2801, in the sense of authorizing the installation of pay sections at the provincial hospitals for the benefit of the well-to-do classes.
2. The enactment of a law authorizing the appropriation of 1,600,000 pesos for carrying out the plans for building eight provincial hospitals with their corresponding maternity services.
3. The immediate organization of maternity service to patients at their homes in such towns as may have a sufficient number of physicians and nurses to carry on the work.
4. The appointment of a committee to study and propose such measures as will make the medical profession more attractive to our young men.

## CLINICAL ANALYSIS OF ONE HUNDRED CASES OF ENTEROCOLITIS WITH ESPECIAL REFERENCE TO EDEMA, DEHYDRATION, AND PUTRID ODOR OF STOOLS

By Drs. JOSÉ ALBERT and FÉ HORILLENO

These one hundred cases were observed from May 1 to November 11, 1919, during which time the yearly outbreak of bacillary dysentery usually takes place in this city, especially during the months of June and July.

All these cases were examined by Professor Haughwout, and no single case was found positive for entamoeba histolytica, thus confirming previous experience as to the rarity of this kind of dysentery in children. The object of this paper is to present certain clinical features of acute enterocolitis as observed in the children's ward. Rather than express an opinion on the many conclusions arrived at with reference to this important infection, we will present some facts and figures; and before taking up the discussion of the edema, dehydration, and putrid stools we will present some tables which we think will be of value for the better interpretation of this dreadful disease.

The following tables are self-explanatory and require but few comments.

The first table gives the morbidity of the six commonest and most important diseases in children; the second represents the mortality of the epidemic of enterocolitis during this year; the third, the distribution of the cases according to different ages; the fourth, the final cause of death; the fifth, the day of death; the sixth, the number of stools in twenty-four hours on admission of those who died (this gives the relation between the number of stools and the fatality); and the seventh, the average duration of the disease in those who recovered.

TABLE 1.—*Most important diseases admitted from May 1 to November 11, 1919.*

Total admissions	397
Pneumonias, lobar and lobular	<sup>a</sup> 121
Typhoid	<sup>b</sup> 21
Nephritis	13
Beriberi	11
Meningitis	6
Ileocolitis or dysentery	100

<sup>a</sup> Ten, or 8 per cent, died.

<sup>b</sup> Three, or 13 per cent, died.

TABLE 2.—*Cases that recovered or improved, and cases that died.*

Recovered or improved	59
Died	38
Discharged against advice, in serious condition	3

TABLE 3.—*Distribution of cases according to age.*

Age.	Cases.	Died.	
		Number.	Per cent.
Under 1 year:			
Breast-fed .....	5	1	20
Artificially fed .....	11	9	81
	16	10	60
From 1 to 2 years .....	30	14	46
Over 2 years .....	54	14	25.9

TABLE 4.—*Cause of death.*

	Cases.
Toxemia	16
Bronchopneumonia	14
Gingivitis, gangrenous	5
Furunculosis	1
Pyelocystitis	1
Progressive cachexia	1

TABLE 5.—*Day of death.*

	Cases.
Before the 7th day	7
On the 8th to the 15th day	8
On the 16th to the 23d day	7
On the 24th to the 30th day	9
After the 30th day	7

TABLE 6.—*Number of stools in twenty-four hours on admission of those who died.*

	Cases.
Less than 10 stools	20
11 to 21 stools	16
22 to 32 stools	1
More than 32 stools	1

TABLE 7.—*Total duration of disease in those improved or recovered.*

Cases.	Days.
19	16 to 23
12	24 to 31
9	8 to 15
7	32 to 39
4	40 to 47
8	47 +

3 discharged against advice, in serious condition.

It will be seen that the average duration in over 50 per cent of those with favorable course is from three to four weeks; complete recovery is seldom reached before two weeks.

#### EDEMA

The survey of these one hundred cases showed that thirty-seven presented edema, twelve of which died. Edema may be considered therefore as a not infrequent symptom of enterocolitis in children.

It appears ordinarily after the first week of the onset of the disease, more commonly in the face; and, contrary to the opinions of others, our experience has shown that when it appears at the end of the first week it usually means a favorable outcome; that is, that we may look upon it as the forerunner of convalescence. In such cases the edema lasts only a few days and the retention of fluids by the tissues seems to favor disintoxication by diluting toxins.

However, when it appears very late in enterocolitis with protracted course and frequent relapses, this symptom must be considered an unfavorable sign of prognosis, indicating chronic advanced toxemia or cachexia, or a complication of the kidney.

#### DEHYDRATION

Dehydration, desiccation, exsiccation, or anhydremia as it has lately been called by Marriott, of St. Louis, is another symptom to be taken into consideration in acute enterocolitis. Thirty-nine of the one hundred cases presented this symptom, of which twenty-two died. It is therefore a sign of unfavorable prognosis.

One distinguished English authority said, in connection with the great importance of this symptom in the treatment of this disease: "while the bacteriologists are discussing the types of bacilli, the patient died on account of the dehydration which increases the absorption of the toxins."

This symptom when very marked appears in infants as the clinical picture called "Habitus Toxicus;" namely, eyes sunken, features sharpened, angles of the mouth drawn down, peculiar pallor, fontanelles depressed, overlapping of the cranial bones, reduced turgor of the skin, and an expression of anxiety overspreading the whole countenance.

It augurs a very unfortunate outcome and demands an immediate supply of fluid by hypodermoclysis or phleboclysis in order to check the severe toxemia.

## PUTRID ODOR OF STOOLS

We recorded eleven cases of this kind of stools, considered by French authors as a sign of gangrenous enterocolitis, and we have been impressed with its bad significance in regard to the prognosis. Eight cases with this sign died among the eleven, giving a mortality of 72 per cent.

## THE COMPLEMENT FIXATION TEST FOR SYPHILIS: INCUBATION FOR FIXATION AT ICE-BOX TEMPER- ATURES

By First Lieut. JOSEPH W. SMITH, Jr.  
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To designate the Wassermann reaction as a complement-fixation phenomenon is not strictly in accord with our knowledge of the test. The reaction was at first regarded as an immunity test depending upon a reaction between antibodies specific for *Spirochæta pallida* on the one hand, and the specific protein constituents of this pathogenic organism on the other. Looked at in this way, a positive test would indicate the existence of specific syphilis antibodies in the serum of a patient. This conception was perforce abandoned several years ago. It has been amply demonstrated that extracts of cultures of *Spirochæta pallida* as well as extractions from the testes of syphilitic rabbits do not furnish an antigen suitable for the Wassermann reaction. At present it is quite generally believed that the test is not a specific complement-fixation in the sense of Bordet and Gengou, but that it is a somewhat analogous reaction, dependent upon the presence, in the serum of syphilitic patients, of substances produced indirectly because of the presence of syphilitic infection. It may be a relative increase of globulins, or a change in the physical state of the globulins or of other substances present in the serum.

None of the theories of the Wassermann reaction has been definitely proven; all are still only theories, or probably really no more than hypotheses. However, despite the lack of logical, theoretical considerations in relation to the test, and although much that has been said and written and done regarding it has been erroneous, the Wassermann reaction has a soul of truth and has persistently survived all manner of abuse and mutilation. It finds its justification in its practical value, attested by experience. As a necessary corollary it results that a proposed antigen or a proposed technic finds favor not according to its theoretical specificity but only through extensive and satisfactory use upon a large series of patients. Although clinical satis-

faction cannot be accepted without reserve as final proof of scientific accuracy, in the long run it is a very safe criterion. In the case of the Wassermann reaction, clinical satisfaction is our only criterion. This may be rather distasteful to some of us who have been prone to decry empiricism. The Wassermann reaction is purely empirical in the sense that it is experimental rather than scientific. The failure to appreciate this fact has led many physicians astray. It has led to errors both in the laboratory and at the bedside. The laboratory worker should not fail to check his results, whenever practicable, with the clinical aspects of the cases. The clinician should never regard the Wassermann reaction as an infallible means to the easy diagnosis of syphilis. He is perfectly correct in looking upon a positive Wassermann reaction as the most constant single symptom of lues. But before a clinician accepts a report as positive he should have done one of two things: either he should have supplied the laboratory man with all available clinical data, or he should have familiarized himself with the particular test which is done in the laboratory to which he sends his sera so that he is himself in a position to interpret the test. Until such time as the test shall have been standardized and made "fool proof," certainly one or the other of these alternatives should be adopted.

It is well recognized that widely different results may be obtained in Wassermann reactions by the use of different antigens, and by the employment of different incubation conditions even with the same antigen. In a communication published<sup>1</sup> in collaboration with Dr. Ward J. MacNeal, I reported upon Wassermann tests done by me in the laboratories of the New York Post-Graduate Medical School and Hospital by three methods, on 496 identical specimens of sera and spinal fluids from 477 patients. In the first method a cholesterol-reinforced antigen was employed, and the first incubation was carried out at 37° C. In the second method a simple alcoholic extract was used as antigen, with incubation also at 37° C. In the third method the latter antigen was again employed, but the first incubation was carried out in the refrigerator for from four to twenty-four hours. The last method proved more sensitive in the group of known syphilitics than the other procedures tested. Furthermore, a positive result thus obtained proved to be more trustworthy evidence of syphilis than did positive results obtained with the cholesterol-reinforced antigen and first incubation at 37° C.

<sup>1</sup> Journ. Immun. 2<sup>1</sup> (1916).

In a second paper<sup>2</sup> Doctor MacNeal and I presented the results of Wassermann tests performed in the laboratories of the New York Post-Graduate Medical School and Hospital by six methods, on 501 identical specimens from 457 patients. In the first of these six methods a cholesterol-reinforced antigen was employed, and the first incubation was carried out at 37° C. In the second method a simple alcoholic extract was used as antigen, with incubation also at 37° C. In the third method an antigen prepared from the acetone-insoluble fraction of beef heart after the method of Noguchi was used, with incubation also at 37° C. Exact duplicates of these tests were prepared and incubated at 8° C. for four hours. Tests 4, 5, and 6 differed from tests 1, 2, and 3, respectively, only in the temperature and the length of time for the first incubation.

Each antigen was titrated for hemolytic effect, for anticomplementary action, and for specific antigenic property. The titrations were made for each set of incubation conditions, that is 37° C. for one hour and 8° C. for four hours.

The hemolytic system used was the sheep-rabbit system. Two units each of amo and complement were used in the tests. This system is quite sufficiently loose to obviate very largely the danger of nonspecific fixation. And yet, as will subsequently appear, we found reactions in 16 of the 501 tests (3 per cent), which we feel inclined to regard as false positive reactions.

The sera and spinal fluids were always heated at 56° C. for thirty minutes just prior to being tested.

The cases presented were divided into two classes, on the basis of history. The known syphilitics made up the first class. In this group were recorded 92 reactions in 80 cases. At 37° C. antigens B.H.C. (cholesterinized extract of beef heart), B.H.P. (simple alcoholic extract of beef heart), and B.H.A. (acetone-insoluble extract of beef heart) yielded, respectively, 52, 26, and 31 per cent of positive reactions, while by the ice-box method, on the other hand, they gave in the same order 76, 64, and 48 per cent of positive tests.

The second class of cases was composed of those in which there were no histories of syphilis. On the basis of the physical findings it was possible to form several subdivisions of this group, the first of which consisted of those cases which presented lesions typically luetic. In 27 reactions in 24 patients in this group the results were as follows: At 37° C., cholesterinized extract of beef heart, simple alcoholic extract of beef heart, and

<sup>2</sup>Journ. Inf. Dis. 21<sup>3</sup> (1917).

acetone-insoluble extract of beef heart, 92, 66, and 77 per cent, respectively; at 8° C., 100, 92, and 88 per cent, respectively. The second subdivision, those probably syphilitic although not evidently so, consisted of 20 patients upon whom 25 tests were done with the following results: At 37° C., cholesterinized extract of beef heart, simple alcoholic extract of beef heart, and acetone-insoluble extract of beef heart, 84, 48, and 68 per cent, respectively; at 8° C., 92, 88, and 80 per cent, respectively.

We came then to another group of cases in which again there were no histories of syphilis nor of antisyphilitic treatment. In some of them the physical findings were rather vague and the clinical diagnoses not stated with any degree of assurance, but in others the findings were quite definitely not those of syphilis and the diagnoses were of conditions not syphilitic; such, for example, as acute articular rheumatism and typhus fever. In this group we had 16 patients with 16 tests. In all of these there was complete or partial fixation of complement with antigen cholesterinized extract of beef heart, either at 37° C. or at 8° C., or both, associated with absence of fixation with either of the other antigens. We feel rather confident that the cases in this last group were not syphilitic and that the complement fixation obtained in them was nonspecific. The cholesterin-reënforced antigen was the only one to give positive results in this group and it appeared to be more unreliable at the higher temperature than at the lower.

There were 341 tests on 317 nonsyphilitics, in none of which was any degree of fixation obtained with any of the antigens under either condition of incubation. Thus, in 357 tests on 333 nonsyphilitic patients the cholesterin-reënforced antigen gave positive results in 2.2 per cent at 37° C. and in 1.4 per cent at 8° C.

As a result of these studies Doctor MacNeal and I were convinced, first, that the use of the cholesterinized antigen with first incubation at 8° C. for four hours constitutes a more sensitive test for syphilis than does any of the other methods examined; secondly, that the cholesterinized antigen, both at 37° C. and at 8° C., is apt to yield nonspecific fixation. Therefore, in a diagnostic reaction, fixation with the cholesterinized antigen alone is at best of only doubtful significance. We were further convinced that the simple extract antigen, with the first incubation at 8° C., is more sensitive than the cholesterinized antigen at 37° C., and in this series it gave no false positive reactions, according to the available evidence.

On the strength of these results we adopted the ice-box Wassermann, using the simple alcoholic extract of beef heart antigen as our routine test at the New York Post-Graduate Medical School and Hospital. When I visited there in August of last year it was still giving excellent satisfaction.

The routine Wassermann reaction done in the laboratories of the New York City Department of Health is the ice-box test, using the simple alcoholic extract antigen. The value of fixation at ice-box temperature was pointed out in New York City as early as 1912, by Dr. Archibald McNeil, then of the Department of Health. O. Berghausen<sup>8</sup> has recently commented on the superiority of ice-box fixation. He has adopted it as routine in his laboratory. E. H. Ruediger<sup>4</sup> has lately made rather extensive studies of the relation of temperature to complement-fixation. He endorses ice-box fixation.

It is my belief that incubation at 8° C., or thereabouts, for from four to twenty-four hours, and the use of two antigens, one a simple alcoholic extract and the other a cholesterinized extract, makes a very much more sensitive test and also a far more reliable test than that which is ordinarily done. In known syphilitics the reaction with the cholesterinized antigen may be used as a guide to treatment. In a diagnostic test the reaction with the simple alcoholic extract antigen may be relied upon.

In closing, let me add that, no matter how delicate the reaction nor how reliable or specific it may be reputed to be, one should never diagnose syphilis on a single positive Wassermann reaction alone. Keep the patient under observation and under suspicion. Go over him again and again. Look especially to his aortic arch. Have the test repeated. Have it done, if possible, by the ice-box method with a simple alcoholic extract antigen. If it is then positive you may feel justified in putting your patient upon antiluetic treatment.

<sup>8</sup>Journ. Am. Med. Assoc. (1919).

<sup>4</sup>Journ. Inf. Dis., two recent contributions.

## DIPHTHERIA IN THE PHILIPPINE ISLANDS

By Drs. LIBORIO GOMEZ, AMANDO M. KAPAUAN, and CATALINO GAVINO

Diphtheria is not a frequent disease in the Philippine Islands, but it has been apparently on the increase in the last few years or else it is beginning to be more widely recognized. It was thought advisable, therefore, to give a brief description of the disease as it occurs in the Islands, based on data obtained from the records of the Philippine Health Service, the San Lazaro Hospital, the department of pathology of the University of the Philippines, the Bureau of Science, and from personal observations.

### INCIDENCE

Practically all the data regarding the incidence of the disease are drawn from the Health Service statistics for the city of Manila, as the reports from the provinces are rather incomplete and unreliable. The following figures (Table 1), taken from the annual reports of the Director of the Philippine Health Service, cover the period from 1900 to 1918 and indicate cases and deaths that are either positive clinically only or positive clinically and bacteriologically.

TABLE 1.—*Diphtheria in Manila.*

[From reports of the Bureau of Health.]

Fiscal year.	Cases.	Deaths.	Fiscal year.	Cases.	Deaths.
1900	1	1	1910	28	10
1901	0	0	1911	25	16
1902	4	4	1912	49	17
1903	2	2	1913*	1	(?)
1904	4	4	1914	38	13
1905	7	7	1915	59	23
1906	8	8	1916	114	30
1907	15	13	1917	79	27
1908	18	9	1918	45	15
1909	7	0	Total	504	199

\* Last six months of the year.

The disease occurs sporadically, not any one district of Manila being particularly affected. It does not seem to be very

contagious, and usually no definite outbreak of the disease in the immediate neighborhood of the affected cases could be traced. There was only one instance in 1918 and one in 1919 of cases occurring in the same household, the persons affected being brothers and sisters.

There is an impression among practicing physicians that diphtheria is liable to occur oftener in damp, cold weather when other catarrhal affections of the respiratory tract are more frequent; but the statistics of the Health Service for four years from 1915 to 1918 and the records of cases treated in San Lazaro Hospital in 1919, presented in Table 2, do not show any particular seasonal incidence.

TABLE 2.—*Monthly incidence of diphtheria.*

Month.	Diphtheria in Manila (Bureau of Health).				San Lazaro Hos- pital.
	1915	1916	1917	1918	
January .....	4	13	16	15	2
February .....	2	4	7	5	3
March .....	4	5	13	5	4
April .....	4	17	1	9	7
May .....	6	5	1	2	4
June .....	3	11	6	3	8
July .....	6	7	4	2	6
August .....	3	16	9	0	3
September .....	4	13	8	1	7
October .....	7	7	6	1	2
November .....	8	9	5	0	2
December .....	8	7	8	2	5

No race is exempt. Among sixty-two cases of diphtheria treated in San Lazaro Hospital during the entire year 1919 and the months of January and February of 1920, there were fifty-six Filipinos, three Chinese, two Spaniards, and one American mestiza. Among the twenty-seven cases autopsied at the College of Medicine and Surgery, University of the Philippines from 1908 to 1920, there were twenty-four Filipinos, one Russian, one American, and one American mestiza.

Diphtheria occurs most frequently in children during the first five years of life. Among the sixty-two cases admitted to San Lazaro Hospital as noted before thirty-four, or 54.8 per cent, were children from 2 to 5 years of age; nineteen, or 30.6 per cent, under 2 years of age; six, or 9.6 per cent, from 6 to

10 years of age; three, or 4.8 per cent, were more than 15 years of age, one being an adult 35 years old.

There seems to be a greater prevalence in males than in females. There were thirty-six males and twenty-six females in the San Lazaro cases, nineteen males and eight females in the autopsy cases.

#### CLINICAL RÉSUMÉ

This is based on the clinical records of cases diagnosed clinically as diphtheria in San Lazaro Hospital during 1919 and January and February of 1920. Altogether sixty-two cases have been studied, in thirty-one of which the diagnosis was confirmed bacteriologically.

The patients are usually admitted to the hospital with the following symptoms noted by the relatives: Slight fever, cough, sore throat, difficulty in swallowing, stertorous and difficult breathing, and more or less cyanosis.

The local findings are similar to those in other countries; there is a hyperemia of the pharynx extending beyond the pillars of the fauces and a characteristic grayish white pseudomembrane which leaves a bleeding surface when detached. The pseudomembrane most often involves both tonsils, frequently extending to the uvula and to a slight extent to the pharynx, soft palate, and larynx. Three cases were diagnosed as diphtheria but showed no typical membrane, one case showing only some white mucus patches on the tonsils; on bacteriological examination, however, this case was found positive for the Klebs-Loeffler bacillus.

The fever is rather low in the majority of cases, as shown by the following data taken on admission from sixty-one patients. In one case the temperature was not taken as the patient was practically in a dying condition when admitted.

TABLE 3.—*Temperature on admission.*

Temperature.	Patients.	Per cent.
37° C or below .....	9	14.7
37° but less than 38° C .....	15	24.2
38° but less than 39° C .....	30	49.1
39° but less than 40° C .....	6	9.8
40° or above.....	1	1.6

The pulse rate is accelerated, ranging as a rule from 100 to 120 per minute, depending on the age of the patient, the temperature, toxic symptoms, and heart complications. There was no study on abnormal characters of the pulse. Of the sixty-

as a result of injection of diphtheria antitoxin; there was no throat involvement.

A practically pure culture of *Bacillus diphtheriae*, of the short variety, type E of Wesbrook, was isolated from the nose but not from the throat. This strain was of rather low virulence (see No. 16, Table 4). The patient recovered completely after having been treated with 8,000 units of diphtheria antitoxin, and washings of the nose and throat with alkaline antiseptic solutions.

#### BACTERIOLOGY

In only thirty-one of the sixty-two cases studied in San Lazaro Hospital was the diagnosis confirmed bacteriologically. This is probably due to faulty technic with the early cases of the series, for when more attention was paid to the bacteriological work a greater number of positive results was obtained. Twenty-one, or 87 per cent, of twenty-four cases admitted to San Lazaro Hospital from September 26, 1919, to February 23, 1920, were positive. In twenty of these the bacillus was isolated in pure culture and the characteristics of the different strains studied, as shown in Table 4.

The cultures were made in Loeffler's blood serum, and all showed Gram positive bacilli with more or less V-shaped arrangement, characteristic polar bodies specially demonstrable by the Neisser Giin stain, producing acid reactions in Hiss' serum water carbohydrate media as follows; strong in the glucose, weak in the dextrin, and none at all in the saccharose. In practically all cultures the various types of Wesbrook, Wilson, and McDaniel could be identified, but we present in Table 4 only the most predominant one as seen in smears of from eighteen to twenty-four hours old Loeffler's blood serum culture.

The virulence test was performed according to the method recommended by Kolmer and Moshage; (4) that is, subcutaneous injection into a 250- to 300-gram guinea pig of 4 cubic centimeters of a 10 cubic centimeter salt solution emulsion of a twenty-four hours old Loeffler blood serum culture. With eighteen of the cultures the guinea pig died within two days after inoculation showing, on autopsy, characteristic subcutaneous gelatinous oedema, which was sometimes haemorrhagic, and intense congestion of the suprarenal glands. In one culture (No. 17) the guinea pig died after five days with congested adrenals, haemorrhage, and necrosis, but no characteristic subcutaneous oedema. In another (No. 2) the guinea pig was alive twelve days after inoculation, showing no characteristic

TABLE 4.—*Bacteriology of clinical cases.*

No.	Name.	Age.	Sex.	Disposition.	Date of obtaining the culture.	Morphology type.	Acid reaction.			Virulence.		Days alive after injection.
							Glucose	Saccharose	Dextrin	Oedema.	Adrenals.	
1	R. B.	3	F	Cured	Sept. 27, 1919	B	+	-	+	+	+	2
2	A. R.	10	F	Died	Oct. 19, 1919	E	+	-	+	-	-	<sup>a</sup> 12
3	M. M.	9	F	Cured	Nov. 12, 1919	C	+	-	+	+	+	2
4	E. S.	1 8	M	Died	Nov. 24, 1919	C	+	-	+	+	+	2
5	N. R.	2 8	F	do	Dec. 13, 1919	B	+	-	+	+	+	1
6	S. R.	5	F	Cured	Dec. 13, 1919	B	+	-	+	+	+	1
7	A. B.	1 4	M	do	Dec. 16, 1919	B	+	-	+	+	+	2
8	F. A.	2	M	Died	Dec. 21, 1919	B	+	-	+	+	+	1
9	J. T.	2	M	do	Jan. 22, 1920	C	+	-	+	+	+	2
10	C. S.	5	F	Cured	Jan. 26, 1920	A	+	-	+	+	+	2
11	C. V.	3	M	Died	Jan. 30, 1920	B	+	-	+	+	+	2
12	J. V.	3	F	do	Feb. 1, 1920	C	+	-	+	+	+	2
13	A. J.	2	M	Cured	Feb. 6, 1920	A	+	-	+	+	+	2
14	G. V.	35	F	do	Feb. 14, 1920	B	+	-	+	+	+	2
15	C. T.	2	M	Died	Feb. 11, 1920	C	+	-	+	+	+	2
16	P. F.	2	M	Cured	Feb. 13, 1920	E	+	(b)	+	(c)	+	5
17	E. B.	5 6	M	do	Feb. 13, 1920	B	+	-	+	+	+	1
18	N. E.	2 4	M	Died	Feb. 18, 1920	D	+	-	+	+	±	1
19	M. T.	1 6	F	do	Feb. 20, 1920	C	+	-	+	+	+	2
20	L. S.	8	F	Cured	Feb. 23, 1920	C'	+	-	+	+	+	1

\* The virulence test was done three times. One guinea pig died five days after inoculation; another died after nineteen days, showing in no case characteristic changes.

<sup>b</sup> There was apparently some decoloration and coagulation.

<sup>c</sup> The guinea pig on autopsy showed hemorrhagic and necrotic area around the site of inoculation but no characteristic oedema.

symptoms. In view of these findings we consider eighteen of the cultures virulent, one weakly virulent, and one avirulent.

#### PATHOLOGY

There were, altogether, twenty-seven autopsies made at the College of Medicine and Surgery, University of the Philippines, since 1908 up to the time of the writing of this paper. In eighteen of these positive bacteriological diagnoses were made.

The cases autopsied were usually fairly well-nourished children, in which, on opening the throat organs, a definite dirty white-gray pseudomembrane was shown which left an abraded mucosa when torn off. This membrane was firmly adherent at times, and easily detached or practically loose at others, causing a more or less mechanical stenosis of the respiratory passages. There was also found congestion of the lungs, or definite bronchopneumonia, which was at times haemorrhagic. The kidney and liver exhibited more or less parenchymatous degeneration, and the spleen, lymphoid hyperplasia. The heart also showed parenchymatous degeneration and more or less dilatation of the right side. There was only one autopsy in which there was a distinct record of a fatty heart on gross examination. There were thirteen cases, or 48 per cent, which showed bronchopneumonia. There is no record of histological examinations in any of these autopsies.

The location of the membrane is interesting because of its striking frequency in the larynx as compared with figures from other countries, such as those given by Osler(5) in Table 5, where percentages are given in relation to the total number of cases showing membrane, which gives a lower relative percentage for the Philippine autopsies than would be the case were the figures compiled from the total number of cases.

TABLE 5.—*Location of diphtheritic membrane.*

Location.	Osler's cases.*		Philippine cases.	
		Per cent.		Per cent.
Tonsils .....	65	51.1	15	57.6
Pharynx .....	51	40.1	12	46.1
Larynx .....	75	58.8	24	92.3
Epiglottis .....	60	47.2	6	23.0
Trachea .....	66	51.9	9	34.6
Bronchi .....	42	33.0	3	11.5
Stomach .....	5	3.9	1	3.7
Duodenum .....	1	0.7	1	3.7

\* Osler's figures are compiled from 220 autopsies showing membrane present in 127, or 55.4 per cent; whereas the figures for the Philippines are taken from 27 autopsies showing membrane present in 26, or 96.3 per cent.

## MORTALITY

Looking over the summary of yearly reports of the Philippine Health Service regarding incidence of the disease in Manila (Table 1) from 1900 to 1918, we find five hundred four cases of which there were one hundred ninety-nine deaths, or 39.4 per cent. From the sixty-two cases admitted to San Lazaro Hospital during 1919 and first two months of 1920 there were twenty-three deaths, or 37 per cent. Confining ourselves to those cases which were bacteriologically confirmed in this last series we find that out of thirty-one cases bacteriologically positive, there were twelve deaths, or 38.7 per cent.

The mortality is greatest during the first five years of life. In the San Lazaro Hospital cases there were seven deaths, or 36.8 per cent, in nineteen children under 2 years of age; fourteen deaths, or 41.1 per cent, in thirty-four children from 2 to 5 years old; two deaths, or 33 per cent, in six children 6 to 10 years old; and no death in the three cases more than 15 years of age. Among the twenty-seven autopsy cases there were thirteen children, or 48.1 per cent, under 2 years of age; ten, or 37 per cent, from 2 to 5 years of age; two, or 7.4 per cent, from 6 to 10 years; and two, or 7.4 per cent, adults.

The percentage of mortality is rather high, especially if we take into consideration the fact that the cases admitted to San Lazaro Hospital were injected at once with antitoxin without awaiting the results of bacteriological examination. It corresponds to the mortality in cold countries in the pre-antitoxin era but is much higher than that shown by statistics subsequent to the introduction of antitoxin, which is only about 14.6 as against 9.8 per cent (Osler).

This high mortality was already remarked upon by Dr. Salvador V. del Rosario,(2) chief of Manila Sanitation. He suggests that it might be due to atypical mixed infections or to the tardy administration of antitoxin following delayed diagnosis. The last supposition is contradicted by the meager information regarding the prevalence in Manila or in the Philippine Islands of post-diphtheritic paralysis which is so commonly observed in recovered cases of genuine diphtheria to follow upon the belated administration of the antitoxin.

In isolating *Bacillus diphtheriae* we have paid no attention to other concomitant bacteria; but we have observed streptococci in abundance in at least two cases, one of which recovered promptly, and the other proved fatal. If we examine the number of days the patients were sick before reporting to

San Lazaro Hospital, which is practically the period that elapsed before the administration of the antitoxin, we find that there is no marked difference between the cases that recovered and those that proved fatal, as shown in Table 6.

TABLE 6.—Number of days sick previous to admission to San Lazaro Hospital or antitoxin treatment.

Days.	Cases.		
	Recovered.		Fatal.
		Per cent.	Per cent.
1.....	3	7.6	2.....
2.....	4	10.2	1.....
3.....	5	12.8	1.....
4.....	8	20.5	10.....
5.....	5	12.8	3.....
6.....	4	10.2	
7.....	3	7.6	3.....
8.....	3	7.6	1.....
9.....			1.....
Undetermined.....	4	10.2	1.....
Total.....	39	.....	23.....

Brownlee(1) states that in England the disease is, as a rule, most fatal in towns where it is least prevalent, and Park and Bolduan(6) think that in some instances this is due to the fact that in years when the disease is not epidemic the proportion of laryngeal cases is greater than usual. This seems to tally with the experience in the Philippines where, as shown by the autopsy records, distinct diphtheritic laryngeal lesions were found in twenty-four out of twenty-seven cases of diphtheria autopsied by the pathologists of the University of the Philippines. Such lesions would naturally aggravate the disease by mechanical obstruction, increased toxemia due to the greater extent of the membrane, and greater liability to bronchopneumonia that may be brought about by aspiration.

#### SUMMARY

1. Diphtheria occurs in the Philippine Islands and shows practically the same clinical manifestations and bacteriological and pathological findings as in other countries.
2. It is rather infrequent and does not seem to be so contagious; nor does it develop in epidemic form.
3. It occurs in all races and is more frequent in children during the first five years of life.

4. In spite of antitoxin treatment, the mortality is higher than in other countries, which condition may be due to a greater prevalence of laryngeal cases.

5. Post-diphtheritic paralysis is not of frequent occurrence, and our data regarding it are meager and incomplete.

We desire to acknowledge our appreciation of the courtesy of Drs. Florentino Ampil, H. W. Wade, and José Albert in placing at our disposal the records of San Lazaro Hospital, of the pathological department of the University of the Philippines, and of the pediatric department, Philippine General Hospital, respectively.

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## THE PHYSICIAN AND THE LABORATORY<sup>1</sup>

By Maj. J. E. ASH

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Mr. PRESIDENT and GENTLEMEN: I am very sorry indeed that I cannot bring to you some epoch-making discovery which you might have taken back to your practices and by it wrought miracles on your patients. But this is not even to be a formal paper on a scientific subject, but more in the nature of a one-man debate on the relation of the physician and the laboratory to each other. By physician I mean just plain doctor—that ancient and honorable institution, the general practitioner—and please remember that by laboratory I mean the so-called clinical laboratory and not the institution for scientific research; the latter needs no argument or defense. I know that the unthinking and superficial consider it unnecessary and are apt to look with more or less contempt on the patient and unselfish worker who devotes his time to such apparent trifles as counting the scales on the backs of fleas. But this contempt must change to gratitude when this very information comes to have an important bearing on the study of the relation of the despised flea to still more despised classes.

While essentially a laboratory man—and despite appearances I have had considerable experience in clinical medicine and, through the laboratory, have had the opportunity of observing the work of a great many physicians, specialists and general of all classes, from the best in astute Boston to the worst in cruder parts of the country—and while I have not as yet reached the age of the reminiscent, nor can I afford to do only abstract philosophizing, yet the dual experience has given me the opportunity of observing on the one hand the shortcomings, weaknesses, and successes of the doctor, and on the other the value as well as the limitations of the laboratory in its relation to the practice of medicine, and it has given me a broader perspective of these relations than is possible with a more highly specialized experience. It is some of the thoughts and questions

<sup>1</sup> Presented by permission of the Department Surgeon, U. S. Army, Philippine Department.

that have been roused by these observations that I wish to present and I can assure you that I am impartial, and without prejudice for the one side or the other.

The first and most pertinent question is, of just how much benefit is the laboratory to the practitioner? My unequivocal answer is that, to a man who knows enough medicine to practice it conscientiously, its value is in direct proportion to the degree of his independence of it. In other words, if he is a good man he knows when and how to call on the laboratory, and it is under these circumstances that the relations between the two are the best, and least liable to lead to disappointment. I mean to state that, particularly among the younger men and the careless older ones, there is a great tendency to depend too much on the laboratory for diagnoses and to substitute, for the time-consuming, careful study of the patient and the skilfully applied principles of physical diagnosis, a dogmatic report from the laboratory. To my mind there are two factors responsible for this. In the case of the young doctor, it is the fault of the school, where the laboratory work is necessarily very much emphasized, so that because of the lack of proper coördination between this and his clinical studies, he comes to have an exaggerated idea of its importance. This is more truly the case in the larger schools than it is in the smaller, the object in the latter being to turn out good, practical doctors and not highly trained scientists. I have seen second-year medical students so intent on doing research and turning out some "Arbeit" that they have lost their perspective and held in contempt the experience of the older man who is plodding along by the bedside. There is still room for question as to the advisability of allowing undergraduates to become engrossed in research, for this very reason, except in so far as it is valuable as a feature in the training of their powers of observation and inquisitiveness, and thus strengthening their foundation, rather than having it end as research per se. In the case of the older man, he has taken up the laboratory just as he has any other fad in medicine and particularly so, for in it he sees a way to save time and energy, even though it be at the patient's expense, both monetary and otherwise; and so both classes have neglected the development of the art of medicine or allowed it to slump, and have come more and more to depend on the laboratory to take the place of neglected God-given powers of observation and study. There comes to be a tendency to let George do it,

George in this case being the laboratory. The doctor will have a case that may not be obvious to the superficial examination he is willing or able to give it, so he sends some blood or urine or feces, or maybe all of them, to the laboratory in the hope that a positive report of something or other may be forthcoming and on that report he will pin his faith and it will constitute the basis for his handling of the case without further particular study on his part. Why should he worry further about the diagnosis? Did the laboratory not report a positive Wassermann? "My duty, therefore, ends in a course of treatment for syphilis," he argues. The pathologist says the hemoglobin is low. "Why worry about the possibilities? I'll just give some iron or tonics." Hookworm eggs were found. "That simplifies things considerably. I can kill the worms and all will be well," he says, not stopping to think that perhaps the pathologist has been particularly diligent and has spent a great deal of time in finding one or two ova and that, while hookworms are not particularly desirable guests, one ovum in the stools no more makes a case of ankylostomiasis than one swallow makes an inebriate. The evil of the laboratory, therefore, is to dull the natural senses of the doctor and develop in him a false sense of security and a degree of dependence that is not healthy.

Can the doctor interpret the reports he receives? This is a very important phase of the question. Does he know enough about laboratory work to appreciate its limitations? Does he know the grade of work, the extent of experience, training, and honesty of the man who is doing his work? Or is he satisfied to receive a piece of paper that has on it something definite that he can show the patient, without regard to its accuracy? Much depends on these factors and they must be seriously considered by the clinician. It is as much an obligation on the doctor to select the right laboratory as it is to choose the competent surgeon or other specialist, for the patient depends on his judgment as much in the one instance as in the others.

Granted the doctor knows when to call on the laboratory for help, and granted that the laboratory work he is getting is dependable, can he, as asked before, properly interpret the reports he receives and give them their proper significance? It is here particularly that there should be close coöperation between the two. I claim that the pathologist should know enough clinical medicine to appreciate his relations to it. He should be more than a mere technician. He cannot report in-

telligently unless he has a broad grasp through knowledge and experience of the clinical side of the case, and can discuss the pros and cons intelligently with the clinician.

You must appreciate that it is not always possible to give a cut-and-dried report on a specimen. It is not much more possible to do this than it is for you to give the dogmatic diagnosis that your patient demands. We cannot always be dogmatic and accurate at the same time. It is often necessary to qualify the laboratory diagnosis, just as it is necessary for you to qualify and hedge on your clinical opinion of the case, often, and I might say usually. With some knowledge of the case the laboratory can often suggest an appropriate examination to be applied. I know that the chief reason for keeping the case a secret from the pathologist is to prevent a prejudiced or doctored diagnosis, but the danger from this is more than compensated for by the more intelligent examination and the benefit that the closer co-operation is bound to have on the outcome of the case.

Does the physician further know enough about a laboratory to enable him to send his specimens in proper condition? Does he know that a hemolyzed or old infected serum is not satisfactory for the Wassermann test and will probably be anticomplementary; that a cold stool is unsatisfactory material in which to find amœbæ; that a cell count on the spinal fluid must be done at the bedside to be at all accurate; that hyalin casts will disintegrate in an old specimen of urine? The responsibility for accurate laboratory work is not entirely with the pathologist.

The laboratory has very distinct limitations that you must realize. It cannot manufacture a diagnosis for you out of whole cloth, nor can it always make its findings fit in with your idea of what they should be. It cannot take the place of skilful and careful bedside study. You must realize that a negative report does not as a rule mean very much. Of course its significance is in direct proportion to the skill and care of the man who makes it. A negative report is usually very unsatisfactory to both the doctor and the pathologist, because it does not help the former very much and means a great deal more work for the latter. You know, the pathologist develops a sort of perverted moral sense. A positive specimen usually gives a peculiarly devilish sort of satisfaction to him, despite the meaning it may have for the poor patient. There is a certain amount of glee attached to finding tubercle bacilli in the sputum right off the bat, or being able to demonstrate amœbæ in the stool simply by focusing the microscope. For this spirit, of course,

we owe the patient an abject apology. A negative report should not always be considered conclusive. It requires persistence and a certain amount of luck, and sometimes repeated examinations, to exclude that particular factor, especially if the clinical picture is insistent. Given a primary sore of syphilis, you must remember that a certain time must elapse before the Wassermann test will be positive and that a negative dark field finding in such a sore that has been receiving local treatment means practically nothing. The albumin is not constantly present in a case of chronic nephritis; a drink of whiskey taken a few hours before blood is drawn for the Wassermann may render an otherwise positive serum negative. The spinal fluid in meningitis does not always give the picture it should. Therefore, the negative report must usually be considered with more than a grain of salt.

What, on the other hand, does a positive report mean? Is it really the key to the case, or does it merely speak for an intercurrent condition that may have little bearing on the symptoms at hand? The interpretation, therefore, of the laboratory findings and their proper application are very important features of the relation between doctor and laboratory. My pride has often received a jolt when I have been forced to realize what an unimportant part the laboratory has played in the study of a particular case. In following such cases through their course, even to death and autopsy, with the organs spread before us in plain view on the table, the answer has still been hidden from us, and we could but throw up our hands and realize how little after all our knowledge really is of those essential vital processes that differentiate us as kings of the earth from hulks of clay.

I have been pessimistic enough, for there is much good in the laboratory. We think of the wonderful old stars of our profession, those pioneers who toiled so skilfully and painstakingly in so much medical darkness, and we marvel at the results they attained. The elder Gross did not need a modernly equipped laboratory with a trained pathologist to diagnose cancer of the breast for him; Hunter knew nothing of those peculiar biological properties of the blood serum that were later to be harnessed in the complement fixation test for syphilis, but he usually knew a hard chancre when he saw it. These men used to the utmost the things they possessed. They observed and remembered. I present these and the other staunch pillars of the past as my chief argument for the proposition of the great need of

cultivating as much independence of the laboratory as possible. But these men were wonderful and did great things, and we do not detract from their greatness by suggesting how much greater they would have been in the present day with its increased advantages and with the aid of modern diagnostic methods. It only serves to emphasize how much greater your responsibilities are to-day. You have the same opportunity to develop the powers that lie within you; greater, for they have broken the ground for you in many places. In addition you have the new things. The value of modern methods cannot be denied. How many cases of so-called latent syphilis did the great Hunter miss? There have been untold numbers maltreated for malaria simply because the diagnosis was unaided by the blood examination and the clinical picture was all they had to depend on. On the other hand, there has been many a case of atypical malaria go down without the benefit of specific treatment because they did not know that the disease had a more definite and tangible etiology than the mysterious miasm that arose with the damp night air from marshy places.

I am not particularly enthusiastic about haphazard routine examinations, not so much from the clinical side as from the demoralizing effect they are apt to have on the laboratory. This applies more especially to hospitals, of course. Large numbers of routine examinations may lead to carelessness and superficiality. But even so, conditions are often picked up during such examinations that would otherwise have been overlooked and have remained hidden, so we must look on them as necessary evils. There are certain things you should know about your patient, no matter how obvious the conditions may seem. In this day it is much safer to assume everybody syphilitic until proven otherwise, no matter what his or her civil, social, or sexual state. You should know the condition of the urine as a matter of routine, and in this part of the world, where parasitism is so common, this should be always eliminated in its various common possibilities. There have been many cases of chronic amœbic dysentery operated for appendicitis. But it is not necessary to dwell on the possibilities of the obscure and misleading symptoms that are at times manifested by the various parasites; you are more familiar with them than I am. Nor is it necessary for me to detail further the great benefits that are to be derived from the sane and intelligent use of the laboratory. You cannot practice medicine in this day and generation without recourse to the laboratory.

The general principles that I wish to advocate are these:

1. That it is a greater crime to neglect these benefits than to overindulge them.
2. That there must be the closest coöperation between clinician and pathologist.
3. That the clinician must be familiar with laboratory work to the extent of knowing how, when, and where to depend on it, and the pathologist must be sufficiently experienced in clinical matters to handle intelligently the materials submitted to him; and lastly, I have argued myself, and I hope you also in a measure at least, to the conclusion that the physician does not do full justice to his patient until he has developed to their fullest possibilities the natural powers of observation, has exhausted these on the bedside consideration of the case and then, and only then, given him the full benefit of the aid the laboratory can be in corroborating, elaborating, or eliminating his conclusions. Under these circumstances will you come the nearest to the proper solution of the problem—the diagnosis and treatment of the condition for the relief of which the patient has entrusted himself to your care.

## NOTE ON THE KEEPING QUALITIES OF DRIED AND PULVERIZED VACCINE VIRUS

By Dr. O. SCHÖBL

At the request of the Philippine Health Service, some experiments were made at the Bureau of Science in order to ascertain the method of preparation, and the means of preservation, of dried vaccine virus for practical purposes. The proper distribution of active virus to remote places has always been a problem in the Philippines, on account of geographical conditions, particularly in case of emergency—that is, when smallpox breaks out in a far-away place—because it takes a long time for the vaccine virus to reach its destination. Furthermore, we must take into consideration that there are localities in which there is no way of keeping the glycerinized vaccine virus at low temperature during shipment from the nearest port to these remote places.

It seems, therefore, that it is of great importance to the sanitary authorities of this country to try to distribute vaccine virus in such form that it can be kept even under unfavorable conditions; in other words, in a form in which even if direct light, and sun heat or artificial heat are excluded, the vaccine can still be kept for a reasonable length of time. Were this possible vaccinations could be performed in the interior of islands where communication and ice plants are nonexistent. It would also benefit parts of the Islands which have both communication and ice, in as much as the health officer located in such places could keep on hand a certain amount of vaccine all the time, and if smallpox should break out in his district vaccinations could be commenced within three hours after receiving the report of the first case of the disease in the district. There are no doubt places connected with Manila, but where connection is such that, even if the health officer cable immediately for vaccine virus, several days, and probably a week, must elapse before the required amount can reach him.

In looking over the literature on the subject, we find very few references. Apparently in most countries which have direct communication by land the vaccine virus preserved with glycerine is satisfactory for any occasion, and no further steps need

be taken for the preservation of this important biologic product. In searching for data concerning the dried pulverized vaccine, we have to go back in the literature to 1881 to find the first note on the subject. Reissner in Darmstadt, and Frappoli in Italy, appear to have been the first ones to experiment with the drying of vaccine virus. It was at that time that the preservation of vaccine virus for wide distribution and shipping was desirable; but the glycerinized vaccine virus, as introduced by Muller about the same time, became supreme, and was so satisfactory that no further attempts were made to dry the vaccine virus. As far as the Philippine Islands is concerned, we find a note on the "Preservation of vaccine virus" by E. H. Ruediger in the Bulletin of the Manila Medical Society, August, 1910.

In preparing dried vaccine naturally three requirements have to be fulfilled. First, the drying must take place as rapidly and as completely as possible, and without the application of artificial heat. Second, the preservation must be such as to keep the powder in absolutely dry condition; it must be kept away from light, particularly sunshine, and from heat. Third, the bacterial content of the dried vaccine must be considered; in the absence of glycerine, which in the glycerinized vaccine acts not only as a preservative but also as a bactericide, the bacterial content in the dried vaccine will naturally be higher than in the glycerinized vaccine.

#### EXPERIMENTS PROPER

The vaccine was prepared in the following way: The pulp obtained by scraping a vaccinated animal was ground up in a sterile mortar; spread over a large surface under aseptic conditions and dried rapidly over a hygroscopic chemical in vacuum, ground up, perfectly dried, and kept in a desiccator at room temperature. Every week one monkey was vaccinated with a small portion of this powder and kept under observation in order to ascertain whether or not there was any difference in the development of the "take" in this monkey and that of another one, used as control, which had been inoculated at the same time but with fresh glycerinized vaccine. Up to date of writing, that is, four months from the time the vaccine was prepared (and it was kept at room temperature all the time), we have obtained in all inoculated animals first-class "takes" which could not be distinguished from the "take" in the control animal inoculated with fresh vaccine. We cannot, therefore, at the present writing state definitely how long the dried and pulverized vaccine will keep. But, in view of the fact that the experi-

ments showed good results during the past four months, the procedure seems to be of practical use.

In order to make the use of this vaccine as simple as possible, we have suggested that it be put up in ordinary straight, one cubic centimeter, amber glass vials with rubber stoppers sealed with paraffine, another vial of the same type to contain the glycerine necessary to dissolve the powder immediately before use. The vial is opened by removing the rubber stopper. The glycerine is poured into the vial containing the powder. The rubber stopper is tightly replaced and the contents are shaken for several minutes until the powder has mixed with the liquid. This simple and convenient way of putting up the dried vaccine may not be the best as far as preservation of the dried vaccine is concerned; sufficient moisture may penetrate into the vial to render the vaccine virus inert in less time than four months. It was therefore suggested that, in case the above-mentioned method will not give satisfactory results, the powder be kept in hermetically sealed ampules, or be kept on hand in open bottles placed in a small desiccator containing a hygroscopic chemical.

Besides the experiments already mentioned, we have arranged a field experiment by shipping dried vaccine virus to various places in the Archipelago and back, and then testing its activity on monkeys by vaccination. The places to which dried vaccine was shipped and tested when returned to Manila are: Currimao, Ilocos Norte; Pandan, Ilocos Sur; San Antonio, Zambales; Calapan, Romblon, Pasacao, Culion, Surigao, and Butuan; Cagayan and Iligan; Oroquieta and Dapitan; Zamboanga, Jolo, Cotabato, Quinimi, Glan, Davao, Agutay, and Cuyo. The length of time necessary for shipping and reshipping was twenty-five days. The animals vaccinated with these dried vaccines showed first-class "takes."

The process of drying the vaccine pulp seems to decrease its bacterial content. In the experiments above mentioned the bacterial content decreased three hundred sixty times during the process of desiccating.

It is hoped that this preparation will help a good deal in overcoming some of the difficulties with which health officers meet in eradicating smallpox in the Philippines.

## VENOM OF THE PHILIPPINE COBRA (ALUPONG) NAJA NAJA PHILIPPINENSIS

By Drs. C. MONSERRAT, O. SCHÖBL, and L. E. GUERRERO

The present paper is but a short review of certain investigations which have been conducted by us in the Bureau of Science.

Because of the fact that we are dealing with a snake widely distributed in the provinces of the Archipelago, and because of the belief that it is one of the most poisonous among our native ophidians, we thought it best to study the biologic properties of its poison to gain an idea of its toxic and hemolytic powers, and to attempt to produce a true antiserum which would neutralize its deleterious effect on the organism.

It is generally believed that there exist in the Philippines very few species of poisonous snakes and that the mortality due to snake bites is negligible. Both Griffin and Taylor have disproved this belief by showing that there exists in the Philippines a considerable number of more or less poisonous species of snakes. Of these, the cobra is the most widespread and the one which is probably responsible for the majority of deaths due to snake bite.

Catanjal in a paper published in 1912 claims that in the Philippines eighty-six persons died in 1909 of snake bite. These deaths occurred in fourteen provinces. The distribution is evident from the following table:

Province.	Cases.	Province.	Cases.
Albay	9	Isabela	1
Ambos Camarines	1	Laguna	3
Batangas	13	La Union	2
Bohol	2	Misamis	1
Cagayan	3	Nueva Ecija	6
Ilocos Norte	18	Pangasinan	16
Ilocos Sur	5	Tarlac	6

Catanjal figures that 3.14 per cent of the deaths in these fourteen provinces were due to snake bite, basing his figures on the data of the 1903 Census. Further statistics of the Health Service during the period between 1913 and 1918 show 847 deaths from snake bite, an average per year of 141.17 deaths. This is 1.41 per each 100,000 inhabitants, taking as a basis a

population of 10,000,000. The number of deaths by years occurred as follows:

Year.	Deaths.	Year.	Deaths.
1913	78	1917	133
1914	163	1918	168
1915	162		
1916	143	Total	847

This snake, known by the native names of *alupong* and *alimuranin*, belongs to the genus *Naja* and was until recently considered to be identical with the species *Naja caeca* and *N. sputatrix*; but investigations of Taylor, of the Bureau of Science, showed that such classification was erroneous because of the differences in characters, such as color, and number and distribution of scales, which exist in the Philippine species as compared with other members of the family. For this reason the Philippine cobra was classified by him as a distinct subspecies, *Naja naja philippinensis*.

#### COLLECTING COBRA VENOM

The poison was obtained from live anæsthetized cobras by pressing the glands with the fingers, the venom being allowed to run down the fang into sterile vials. The fresh poison is a thick, sirupy, colorless liquid of opalescent aspect. When desiccated in vacuo it forms small yellowish flakes. The amount of poison which we obtained from an adult *Naja naja philippinensis* at any one time weighed approximately 0.052 gram after drying.

#### BIOLOGIC PROPERTIES OF PHILIPPINE COBRA VENOM

##### I. TOXICITY

The minimum lethal dose of the venom has been ascertained for the following animals: Guinea pigs, rabbits, monkeys, and frogs. Of these the most susceptible is the monkey, and the most resistant is the frog.

The minimum lethal dose for a guinea pig in twenty-four hours after subcutaneous injection is 0.0002 gram per kilogram of body weight, while that for a rabbit is 0.0003 gram; for a monkey, 0.00008 gram; and for a frog, 0.0005 gram.

Calmette found the minimum lethal dose of the venom of *Naja tripudians* for guinea pigs, when administered subcutaneously, to be 0.0004 gram per kilogram of body weight, and Noguchi found it to be 0.0005 gram.

When injected per venam in rabbits it was found by Calmette to be 0.0005 gram per kilogram of body weight; and by Lamb,

0.00035 gram. Lamb gives 0.00025 gram as the intravenous lethal dose for monkeys.

Comparing our figures with those arrived at by other workers, it seems that the venom of *Naja philippinensis* is considerably more toxic for the lower animals than those studied elsewhere. For man the lethal dose of Indian cobra venom was estimated by Lamb at from 0.015 gram to 0.0175 gram, for a person of from 60 to 70 kilograms of body weight, his conclusions having been based on his experiments with monkeys.

Assuming the resistance of man to cobra venom to be intermediate between that of the monkey and the rabbit, we can estimate the minimum lethal dose of the Philippine venom to be about 0.00019 gram per kilogram of body weight, or from 0.0095 gram to 0.0114 gram for a person weighing from 50 to 60 kilograms, the approximate average weight of Filipinos. Therefore, the amount of venom a single alupong possesses, which is estimated to be 0.052 gram, would suffice to kill five persons of 50 kilograms weight.

#### II. SYMPTOMS OF COBRA VENOM INTOXICATION

The symptoms generally observed in the experimental animals are as follows: Twitching of the lids, ears, and sometimes of the muscles of the body; excessive salivation, nausea, and vomiting; loss of voice, rapid respiration, and drop in temperature. We also observed lacrymation and a very marked ptosis of the upper eyelids, especially in monkeys.

From the very beginning there is great weakness. Emission of semen and involuntary defecation take place immediately before death. Death is caused by the cessation of respiration first, while the circulation is affected later.

#### III. HEMOLYTIC PROPERTIES OF THE VENOM

Though the toxicity of the venom of our *Naja* has been found to be somewhat higher than that of the other species of the same genus, its hemolytic power according to our observations is slightly lower.

The venom of *Naja philippinensis*, like that of *Naja tripudians*, can hemolyze washed red corpuscles of man, dog, rabbit, and guinea pig, but cannot hemolyze the erythrocytes of sheep, goat, and cow. These differences are, of course, only quantitative.

The activating power of blood sera of certain vertebrates for the hemolysins contained in the Philippine venom is analogous to that described in the case of *Naja tripudians*, except that

larger amounts of the sera are necessary to produce the same result.

Lastly, the venom of *Naja philippinensis* hemolyzes equally the defibrinated and the washed red blood cells of monkeys.

#### PREPARATION OF SERUM

Following the procedure of Calmette, we used horse for the preparation of antivenom serum. According to this investigator the fatal dose of cobra venom in twenty-four hours for this animal is 0.025 gram. The immunization was begun with a dose amounting to one thousandth part of the fatal dose for the horse.

The injections were made subcutaneously at intervals of from five to seven days, increasing the dose each time. We used the desiccated venom dissolved in salt solution.

Altogether, the horse was under treatment for a period of about ten months, after which time the injections had to be discontinued on account of lack of venom due to the death of our cobras.

We started injecting the horse on May 23, 1918, and by September 11 it was receiving 0.1 milligram of the venom in each injection. On September 12, 10 cubic centimeters of blood were withdrawn from the animal for the purpose of determining the antitoxic power of the serum. In the experiment four guinea pigs weighing from 250 to 450 grams were used. Varying quantities of serum were used (0.2 to 1 cubic centimeter) with a double lethal dose. The result was negative in that all the guinea pigs died within twenty-four hours.

By November 20 of the same year, the horse reached the dose of 2 centigrams of the venom, and six days later another 10 cubic centimeters of blood was taken and the serum again tried on the guinea pigs. The results were again unsatisfactory, since both protected and control animals died, though protected guinea pigs survived the controls by three days.

On January 13, 1919, the horse reached the dose of 12 centigrams of the venom in one injection. The following week blood was obtained and the serum tested on guinea pigs as before. The results this time were satisfactory. The animal that received 2 cubic centimeters of the antivenom serum survived the two control animals.

On April 7, 1919, the horse reached the highest dose of the venom, that is, 0.1555 gram. A few days later, the animal was bled 5 liters of blood. The serum thus obtained was tested for its preventive neutralizing and curative value.

According to our experiments the neutralizing value in vitro was estimated to be 0.4 cubic centimeter for guinea pigs of 400 grams body weight.

This quantity of serum, mixed with a lethal dose of the venom at room temperature for one hour and injected subcutaneously, saved the animals, while 0.6 cubic centimeter of normal horse serum, mixed with the venom as a control under the same conditions, resulted fatally to the experimental animal.

The therapeutic power of the antivenom serum was tried on rabbits. We found that 1 cubic centimeter of the serum injected intravenously saved a rabbit of 1 kilogram body weight from a sure lethal dose of cobra venom.

The effect of the serum as a preventive or curative in case of snake bite in human beings has not been ascertained up to the present. It is the intention of the authors to distribute this serum to provincial physicians who are interested and willing to supply us with information concerning the kind of snake, location of the bite, and also the symptoms of bitten patients. It must be remembered that, in case of cobra bite, death may and very often does occur within a few hours after the patient has been bitten. It would, therefore, be impractical to defer request for a supply of the serum until the snake bite occurs. On the other hand, the care of the liquid serum demands certain equipment, such as an ice box, which a good many of the provincial physicians may not have at their disposal. It is claimed by various authors who have used this serum in other countries that its antitoxic power will remain practically the same for a considerable length of time. Nevertheless, in the absence of proper precautions, contamination may take place which would not only deteriorate the serum but also injure the patient upon injection. We are, therefore, arranging experiments to preserve the serum in dry form in which condition it is analogous to other antitoxins. Preserved in properly sealed ampules the serum will keep almost indefinitely. The dried scales of serum in one vial, and carbolized distilled water in another, has been found satisfactory and most economical for dispatching the serum to physicians, instructions being given that 10 cubic centimeters of the serum be injected subcutaneously as a preventive, and 20 cubic centimeters in case symptoms of snake-bite poisoning have already set in. Another injection of 20 cubic centimeters should be given if satisfactory improvement of the patient's symptoms has not taken place in two hours after the first injection. Injection should be given

as soon as possible. The place of the bite should be opened by incision and a ligature should be placed rather tightly on the proximal end of the extremity above the place of the bite. To avoid formation of gangrene the ligature should not be allowed to stay too long. The incised bite should be thoroughly and repeatedly washed with oxidizing agents (permanganate). The patient should be placed in a quiet, dark place and be given stimulants. In the absence of other stimulants, hot strong coffee should be used. The respiration should be carefully watched and artificial respiration induced in case the natural respiration becomes weak.

It is hoped that in the future it will be made possible to produce larger quantities of serum than has been possible so far. The authors will highly appreciate it if physicians throughout the country will send information as to the possibility of catching live cobras and shipping them to the Bureau of Science, so that a sufficient amount of poison can be collected for the immunization of horses.

## CLINICAL FORMS OF PANOPHTHALMITIS OBSERVED IN THE PHILIPPINE GENERAL HOSPITAL

By Dr. A. R. UBALDO

Very little has been written with regard to panophthalmitis in the literature of the past years. Altogether seventy cases have been observed in the Philippine General Hospital during the period from 1917 to 1919—twenty-one in 1917, twenty-one in 1918, and twenty-eight in 1919. These cases of panophthalmitis ended in total blindness, and this disease is responsible for the greater percentage of blindness caused by ocular diseases.

Inflammation of the eyeball, in which the infection is localized, may start from the anterior chamber and extend to the posterior and to the vitreous, involving the neighboring structures of the uveal tract, choroid, and retina. All of this constitutes what we call panophthalmitis. In fewer words, panophthalmitis is inflammation of all the structures of the eyeball.

Inflammation in such cases is produced by infection, which may have two ways of gaining entrance into the eye; namely, infections coming from the outside, as in all cases of traumatism of the eyeball, perforating ulcers with rupture of the eyeball, etc., known as ectogenous in origin; and internal infections, or infections conveyed to the eye through the circulating blood as in septicæmia, pyæmia, and suppuration of other structures, which are known as endogenous in origin; and in such infections the eyeball appears to be intact and without rupture.

### BACTERIOLOGY

The microorganisms found are very numerous, but the most frequent are: *Staphylococcus*, *streptococcus*, *pneumococcus*, *Bacillus xerosis*, *Diplobacillus moraz Axenfeld*, *Bacillus subtilis*, and *Bacillus pyocyaneus*.

Infections of the cornea by pneumococcus and diplobacillus were the cause of most of the cases of *ulcus serpens*. Out of eighty-five cases of hypopyon keratitis examined by Axenfeld, fifty-five were caused by pneumococcus and twenty-five by diplobacillus.

*Staphylococcus*, *streptococcus*, and *Bacillus subtilis* are mostly found in traumatic wounds.

## ETIOLOGY

I have divided my cases according to the causal factor, as follows:

Infection from corneal ulcers (perforating or otherwise), where the traumatism was due to leaves of plants, 15 cases.

Infection originating from traumatisms, such as wounds (perforating or contused) caused by dust, foreign bodies, etc., 10 cases.

Infection from inflammation of old lesions, as in leucomas, staphylomas, exposure of the eye in facial paralysis, exophthalmic goiter, etc., 10 cases.

Infection from internal causes, that is, endogenous in character, or from some unknown origin, 35 cases.

In the first group occurred several cases of traumatic ulcers of the cornea produced by rubbing of leaves of rice, grass, hemp, the sharp edge of buri, or pineapple leaf, and corneal ulcers from dacrocystitis, trachoma, gonorrhreal ophthalmia, etc.

The second group includes perforating wounds of the cornea due to sharp-pointed bodies such as nails, bamboo sticks, finger nails of a child, cinders, dust, or other foreign bodies rubbed into the cornea and producing *ulcus serpens*. One case of panophthalmitis (the municipal treasurer of Marilao) showed hypopyon within the first forty-eight hours. Among other cases included in this group were those produced by the removal of foreign bodies from the cornea by inexperienced persons; one case from a blow from the horn of a carabao; one due to a blow received during a fight; another case was hit by a stone, and some others were caused by gunpowder explosions near the face, or by small shot hitting the eyes. Some of the cases in both first and second groups showed an accompanying chronic dacrocystitis.

In the third group are cases that occurred as the result of inflammation of old lesions, as in leucomas, staphylomas following smallpox, etc. There are also included here cases resulting from the exposure of the cornea to dryness consequent upon facial paralysis or exophthalmic goiter, in which the lids could not be closed.

In the fourth group, the panophthalmitis was secondary to a local infection outside of the eye, as in pyæmias. In two children, staphylococcia following pustules of the scalp occurred and gave rise to metastatic panophthalmitis. A case of metastatic choroiditis following abscesses of the arm and chest occurred in an old woman, 55 years of age.

#### SYMPTOMATOLOGY

In most cases the loss of vision was more or less complete, with pain and tenderness in the eyeball, lachrymation, and photophobia. As objective symptoms there were redness of the eye, swelling with more or less complete closure of lids, conjunctivitis, congestion and oedema of the conjunctiva, keratitis, hypopyon, some discharge, and opaque cornea.

A case is on record of fatal streptococcia with panophthalmitis, in which the patient was suffering from acute rheumatism. Blood cultures were positive for streptococcus. De Schweinitz also reported a case of bilateral metastatic ophthalmritis in puerperal pyæmia, with recovery of the patient but with loss of vision in both eyes. Bacteriological examination of the conjunctival secretion showed the streptococcus pyogenes.(1)

I also had a very good case of metastatic panophthalmitis or choroiditis in an old woman, 55 years of age, who was suffering from multiple abscesses of the left arm and chest. By a coincidence, the left eye was the one affected. The affection began by immobility of the iris, dimness of vision, whitish lens, and later pain in the left side of the face and chemosis of the conjunctiva, followed by extensive oedema of the lids, and the iris could not be dilated with atropin. In less than a week the condition became markedly worse; the oedema of the lids was so bad as entirely to preclude their opening, even with the help of lid retractors. The size and tension of the eyeball increased, and clear symptoms of panophthalmitis became evident. Enucleation confirmed the diagnosis, considerable turbid matter exuding from the removed eye.

The symptoms of the traumatic cases were different. There was a case of a perforating wound of the cornea due to trauma by a piece of sharp-pointed stick of bamboo, which affected even the iris. However, the patient could still count fingers. The wound was apparently closed and there were signs of only mild inflammation of the eye.

#### TREATMENT

When we have before us a case of an injured eye, the first question which comes up is, whether the wound is perforating or not. The next question is, whether the wound is infected or not. When infection with suppuration is present, one must determine whether the suppuration is localized in the anterior chamber or has extended to the vitreous. These are the problems before the specialist.

Another very important phase of the question which the physician must decide, and which requires the exercise of careful judgment, is whether or not he shall advise removal of the eye, knowing as we do what a great sacrifice such a step would mean to a patient. There are cases where the patient can recognize objects quite well and with only slight pain in the affected eye; but, with the affection extending to the ciliary region, and with great danger of sympathetic ophthalmia, in such instances would the patient submit to removal of his eye as advised by his physician?

When we are therapeutically powerless, we resort to surgical means and advise operation. Saemisch incision, corneal paracentesis, enucleation, and evisceration are the main operative measures generally followed.

Evisceration and enucleation have been performed with about the same frequency in our cases. In our practice, we have preferred to perform enucleation in the less-infected cases, and evisceration in the most septic. In our experience, the time of postoperative treatment in enucleation was considerably less than in evisceration, the former taking an average duration of from one to two weeks to make a good recovery, while the latter required about three to six weeks.

As to the proper time when enucleation should be performed in cases of panophthalmitis, it is interesting to note the experience of Professor Hook,(3) of Zurich, who reports 118 enucleations for panophthalmitis of different origins and in various stages, without registering a single case which showed an unfavorable course.(2)

There is very little danger of intracranial extension of the infection, and no complicating cases of meningitis, even in the severest types of panophthalmitis in which enucleation was performed, have been reported.(3)

Both enucleation and evisceration have their individual advantages and disadvantages, their advocates and foes; and, while enucleation is performed more frequently than any other method of operation, yet the wisest surgeon is he who would utilize the operation best adapted under existing circumstances to his cases.

Many surgeons feel that evisceration is probably safer than enucleation in panophthalmitis. There was one instance reported by De Schweinitz of an interesting case of panophthalmitis, which, after a careful evisceration, developed severe pain in the operated eye, that became so unbearable as to require enu-

cleation, and microscopical examination after the second operation showed uveal tissue that had not been removed.(4)

In our series of enucleations we have followed two methods; by the one method we sutured the rectus muscles and closed up the conjunctiva, and by the other we left the conjunctiva open without suturing the ends of the rectus muscles, making however proper provision for drainage. The results have been satisfactory so far as the recovery of the operated eye was concerned, the time required for postoperative treatment was shorter, and the recoveries uneventful.

Those who advocate evisceration do so on the ground that removal of an eye in the presence of panophthalmitis means exposure to complicating septic meningitis or cellulitis. We have been very fortunate in our cases in escaping such complications or accidents. We have performed twenty enucleations and thirty eviscerations in this series; and from 1911 to 1919 there were one hundred seventy-nine eviscerations and one hundred forty-seven enucleations performed at the hospital.

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## CORNEAL PARACENTESIS

By Dr. HERMINIO VELARDE

Traumatic injuries to the eyes are very frequently observed among the working class in this country. They are usually produced by direct traumatism, either by sticks or other sharp objects, or by the entrance of small, foreign bodies into the conjunctival sacs. Such injuries inflicted upon the cornea, producing destruction of the corneal epithelium, are invariably infected by the numerous organisms present in the conjunctiva and especially in the diseased lachrymal sacs. They produce *ulcus corneæ serpens* with hypopyon and perforation and, invading the deeper and delicate structures of the eyes, cause iridocyclitis, uveitis, infection of the vitreous humor, and panophthalmitis. The usual termination is the total loss of vision and atrophy of the eyeball.

Many patients have come to the hospital with eyes completely destroyed, and either evisceration or enucleation is then imperative. It is certainly very sad that so many eyes have met their fate this way. It is for this reason, and because of so many apparently hopeless cases whose eyes have to be saved, that we are obliged to employ the different methods of treating them, including corneal paracentesis.

The operation which will be discussed with you to-day is not altogether a new one and, in fact, the opening of the anterior chamber of the eyeball was resorted to in ocular surgery long before the period of antiseptic medicine. It was probably first publicly recommended by Nuck in 1698. But due to many failures in those days, probably because of the lack of a proper knowledge of asepsis, the operation was abandoned, and in 1862 many surgeons, among them Sperine and Rigaud-Landrau, actually opposed the method. The English ophthalmologists were also against this method of treatment in those days, but later they accepted evacuation of the aqueous humor as the best treatment for inflammation of this region of the eyes, and in 1840 Mackensie, Middlemore, and Tyrrel made use of the method. Wardrop, in the Edinburgh Medical and Surgical Journal, recommended this treatment in all cases of hypopyon. Carel published an excellent article on the treatment of corneal ulcers

with hypopyon by this method. This operation was, however, not made use of until Guthrie in 1884 (improved later by Saemisch) advocated the treatment, and since then different modifications of the original method have been used with more or less success. Thus I can give you an interminable list of prominent ophthalmologists of different nationalities giving testimony to the subject.

This report is based upon twenty-two cases admitted and treated in the department of ophthalmology, otology and rhinolaryngology in the Philippine General Hospital.

*Age.*—The age varies from 4 to 81 years. The majority of the cases however were 45 years of age.

*Sex.*—Almost twice as many males were affected as females, the relation being 14 males to 8 females. This greater percentage of males is explained by the fact that they are more exposed than are females.

*Etiology.*—In this series of twenty-two cases, the majority of cases of corneal infection were caused by traumatism through injuries of various kinds inflicted upon the corneal surface, which subsequently became infected, leading to most serious complications with disintegration of the corneal substance, panophthalmitis, and total loss of the eye. Such were the conditions of the patients admitted to the hospital; they were altogether too late for any satisfactory treatment.

The following table shows the etiological factors producing the eye lesions of the twenty-two cases we now have on hand:

A. Corneal injury due to:	Cases.
Dust entering conjunctival sacs	7
Tail of fish	2
Sticks	2
Grass leaves	2
Leaf of rattan	1
Leaf of rice	1
Leaf of bamboo	1
Buri strip (dried leaf)	1
Tin can	1
Coconut shell	1
A piece of bone	1
B. Causes not well known by the patients	2

As a rule these patients received the injuries to the eyes accidentally and while performing their daily duties of life. Those working on farms are more subjected to corneal injuries produced by leaves of grass, rice, and other plants, as shown by the three cases.

The case of a four-year old child, whose eye was hit by a piece of tin can while playing with other children, was purely accidental. The injuries caused by sticks, fish tail, coconut shell, buri strip, and a piece of bone were all accidental, not occupational.

The two cases who could not give a definite account of their eye lesions gave the history of getting up in the morning with their eyes red and painful. The condition got worse, and the cornea became white with definite signs of infection.

It is a very common practice among our masses to submit the injured eyes to various dangerous and unscientific procedures of the "herbolarios" and quacks who practice what is commonly known as "cahig." It is certainly surprising that in this stage of our national progress not only the poor ignorant ones submit themselves to these herbolarios (Chinese and Filipino quacks who employ unscientific manipulations), but also many of what we may classify as educated. I still from time to time meet a few cases of those who pour human urine into the eyes when they are infected. Much more frequently, however, we observe people instructing that human milk be dropped into the diseased eyes. These are among the many factors which contribute to making a slight injury to the cornea result in serious infection and, not rarely, terminating in total loss of vision.

The patients admitted to the hospital who were submitted to corneal paracentesis were nearly all advanced cases, having poor vision; most of them could only perceive light, while others had totally lost vision. They are as a rule left abandoned and the patients do not consult the physician until it is too late to carry out any satisfactory treatment. The following table shows the duration of illness of these patients:

Duration of illness before admission to hospital.	Patients.
Less than one week	2
One week	5
Two weeks	2
Three weeks	2
One month	4
Two months	1
Three months	1
Five months	1
Nine months	1

Judging from this table, nineteen cases had their eyes injured long before they came for hospital treatment. A few of them, however, consulted regular practicing physicians and eye specialists before admission. We should always take into account

that traumatic injuries must be considered as emergency cases and, therefore, require immediate attention right after the injury. But, as a rule, these patients come for treatment too late and in very serious condition.

The following enumeration shows the degree of eye infection in these cases:

Three cases with total destruction of the corneal substance, with pus in the anterior chamber and involvement of the ciliary bodies, and with vision very poor and almost negative.

Eight cases with corneal ulcerations and beginning disintegration of the corneal tissues, with hypopyon, and only able to perceive light.

Six cases with corneal ulcers and hypopyon and able to count fingers at the average distance of three feet.

Four cases with superficial ulcers and hypopyon, and vision good except slightly impaired due to photophobia and lachrymation.

Thus, it will be seen that only four had fairly good vision, six could hardly see objects, and the rest could be considered as having totally lost vision.

#### TREATMENT

*Preoperative.*—Patients are submitted to very little or practically no medical treatment. The bowels are opened regularly by cathartics, usually magnesium sulphate or magnesium citrate. If there is much pain in the affected eye dionin (one to two drops of 10 per cent solution) is administered once or twice daily, depending upon the severity of the pains. The eye is kept clean by antiseptic eyewashes and by the use of the silver compounds, usually nitrate (from 1 to 2 per cent), and iodoform powder. Simple, hot, moist compress, or with aluminium acetate well diluted, was applied to the eyes in acute cases, especially in those with involvement of the conjunctival lids. Urotropin, a 30-centigram capsule, was administered internally three times a day in all cases.

*Technic of corneal paracentesis.*—The routine preparation for a regular major ocular operation is made. The eye is put under a complete local anaesthesia with 10 per cent cocaine solution, although in children and nervous patients, and in acute cases with acute pains due to increased ocular tension, general anaesthesia is used. (General anaesthesia was used in some of my cases, and local in others.) The lids are opened by a lid retractor, exposing the eyeball. The eyeball is held with a fixation forceps with the left hand. A narrow-blade, Graefe's cataract

knife is introduced on the outer and lower quadrant near the limbus penetrating the anterior chamber. The knife comes out on the lower and inner quadrant near the limbus on the opposite side, producing an incision along the lower border of the cornea about 10 millimeters long, similar to a cataract incision. This produces an extensive area for drainage of the thick pus in the anterior chamber. By a careful manipulation with a small horn spatula, or with iris forceps, the contents of the anterior chamber are evacuated. This is later followed by washing the anterior chamber with 2 per cent boric acid solution, or sterile water, using a fine curved cannula until all pus and necrotic materials are removed. The ulcer of the cornea is cauterized with thermocautery. Atropin, one to two drops of 2 per cent solution, is instilled, and hot moist compress is applied.

*Postoperative treatment.*—The patients are treated at least once daily after operation. The eyes are examined and the dressings changed every day. Atropin is instilled whenever necessary. Special attention is given to the examination of the iris so that adhesions may not take place. Finely powdered iodoform is sprinkled on the ulcerated cornea whenever necessary. If pus forms again in the anterior chamber and its evacuation is necessary paracentesis of the cornea is again made.

*Result of the operation.*—The result of this treatment is very satisfactory. Of the twenty-two cases operated upon for corneal paracentesis two have completely recovered, nineteen were improved, and one was not improved at all by the treatment. The two cases of recovery left the hospital with perfectly normal eyes and normal vision. Of the nineteen improved, twelve cases have improved vision and the corneal lesions terminated in leucoma. Some of these cases can be submitted to iridectomy for artificial pupil, although they were then too premature to be submitted to such operation. Seven of the improved cases have negative vision with plastic iritis, seclusio et oclusio pupillae; but the corneal lesions were healed up, except in two cases, which were discharged against the physician's advice. The unimproved one showed no sign of improvement and the infection of the eye continued to extend deeper, terminating in panophthalmitis. This case was eviscerated.

The usual result of infected injuries to the cornea is panophthalmitis. From 1911 to the end of 1919, 174 cases were eviscerated and 149 enucleated, or a total of 323 eyes which were removed from the orbit in the Eye, Ear, Nose, and Throat

Department of the Philippine General Hospital. The large number of enucleations and eviscerations led us to work out a more conservative treatment, and to practice various methods of saving the eyes, the most important of which is corneal paracentesis. It must be admitted that but very little has been done on this operation lately, leaving a wide gap in the medical literature.

#### CONCLUSIONS

In conclusion I should like to present to you the following facts for your consideration:

1. The treatment by corneal paracentesis of corneal ulcers, with hypopyon and disintegration of corneal tissues amounting to panophthalmitis, is very satisfactory, producing definite cure with complete recovery of vision and improvement in general of what may be considered as totally lost eyes.
2. This operation produces immediate relief of pains and tenderness of the eyeball caused by the intraocular tension due to the presence of pus and disintegrated tissues filling up the anterior chamber.
3. The evacuation of the pus from the anterior chamber not only gives immediate relief of the symptoms, but also prevents the extension of the infection into the deeper and vital structures of the eyeball which will result in serious complications of the injured eye and may even produce sympathetic ophthalmia of the good eye.
4. This operation gives a great opportunity for the diseased eye to recuperate, so that in those cases where recovery is not complete secondary operations such as iridectomy for artificial pupil may be possible.
5. The operation minimizes the extraction of the eyes by either enucleation or evisceration, keeping the eyeball intact, and in the majority of the cases tattooing of the cornea and plastic operations for the use of artificial eyes may be indicated.
6. The operation is simple and not dangerous, and in the hands of those who are experienced it is one of the safe operations in ocular surgery. It does not require complicated and expensive instruments.
7. Medicinal treatment, except the use of atropin, is practically of no value; this is very important in preventing serious complications largely affecting the vision, such as plastic iritis, seclusio et oclusio pupillae.

8. The technic used in this operation is an original one and different from those recommended by Saemisch, Guthrie, Schwenk, Meyrhofer, Wolfe, Wardrop, and others, in that the incision is made on the lower half of the corneal limbus on the healthy portion of the cornea without splitting the ulcer. The irrigation of the anterior chamber is not recommended by many authors.

Before concluding I should like to avail myself of this occasion to express my gratitude to Professor Ubaldo, chief of the department, for extending to me the opportunity to perform these operations and to carry out my observations on and post-operative treatment of all these cases.

## A CASE OF POLLAKIURIA IMMEDIATELY RELIEVED BY EXTERNAL LIBERATION OF THE PELVIC AND ILIAC PORTIONS OF THE URETER

By Dr. JOSÉ EDUQUE

SIX PLATES

The case I am reporting this morning is that of a Filipina woman, 27 years old, housewife, a native of San Pablo, Laguna Province, and now residing at No. 114 Calle Loreto, Sampaloc District, who came to the hospital complaining of frequent troublesome urination and of a dull pain in the lumbar region, especially at the left loin.

*Past history.*—Measles and chickenpox when a child.

*Marital and obstetrical histories.*—Married in 1909. Had three successive abortions in 1910, 1911, and 1912, and was operated for hysteropexy in 1912 on account of improper position of the uterus. After the operation she was normally delivered of a full-term baby which is now living and well.

*Present illness.*—The present trouble may be said to date back to one year ago, when the patient had frequent attacks of pain in the back, of a dull and intermittent character, especially felt in the left side, and which radiated in several directions, sometimes upward, at other times to the anterior part of the chest, occasionally downward to the sacral region, and many times she felt it going toward the abdomen and bladder regions. She never recollects that these pains were so severe as necessarily to keep her in bed. The pain was never accompanied by nausea or vomiting, although there was frequent anorexia. The patient states that from the time of onset of the ailment up to the time of her admission to the Philippine General Hospital, she had noticed a slow but steady loss in weight. She also noticed irregular rise of temperature and frequent need of urinating, the urine in every instance being scanty and, though micturition was not particularly painful, she felt uneasy and obliged to empty her bladder despite the fact that she voided no more than two to three tablespoonfuls of urine at one time. This desire for frequent micturition was especially troublesome at night when at rest, and frequently kept her awake or disturbed her

sleep. When this happened several successive nights, she felt particularly uncomfortable the day following from loss of sleep; she also lost appetite. According to the patient, when she was still at home there were nights when she lost practically all of her sleep, having to get up from fifteen to twenty times to void only a few cubic centimeters of urine. This happened especially when she had been engaged in somewhat heavy labor during the day or else when she had undergone some strain.

The urine had no definite character; sometimes it was abundant, and at others scanty. Its color on many occasions was somewhat whitish, not amberin, pale and simply cloudy, and at other times, it was lighter, less cloudy, or less opaque. Realizing that her condition grew from bad to worse, she decided to enter the hospital.

Her physical examination revealed: Chest normal in shape, fairly well developed but expanding rather poorly; voice sounds and tactile fremitus apparently normal; left pulmonary apex showed slight impairment in resonance, but no rales of whatever kind could be heard in any region of the lungs. Heart examination was negative.

The abdomen, aside from slight tenderness in the left hypochondrium elicited only on deep pressure, was practically normal. Extremities, negative.

Loin examination: The left lumbar region upon percussion was somewhat tender. By combined palpation, one was able to feel the lower pole of the left kidney, which did not wander even by changing the position from supine to sitting or even standing posture. The right loin showed some second-degree nephroptosis, but without inconvenience to the patient.

*Cystoscopic finding.*—The whole mucosa of the bladder was pale and covered by a thin layer of mucus. There were trabeculae in certain areas at the bottom. Blood vessels scarcely visible. The trigonum vesicæ was a little darker than the rest of the bladder mucosa. The left ureteral meatus was hardly found on account of a rather thick sheet of mucus and pus covering the opening, which was situated in a slightly elevated area in that region. The meatus of the right ureter, on the contrary, was relatively free of such mucus and pus covering and was immediately found.

In view of this finding, my impression was that in the upper part of the left meatus uretericus there was some pathological condition which was not present in the right side. I, therefore, passed the ureteral catheter through the opening of the left

ureter, injected a solution of collargol through the catheter, and had the patient X-rayed. See Plates 5 and 6.

The skiagraph shows that the solution of collargol was found only at the upper third of the ureter, the middle and lower thirds being completely devoid of any of the solution. To my mind, this absence of the solution of collargol from the lower parts meant that the site of pathological stenosis was along the whole extent of the middle and lower ureter, diminishing its lumen, and by periuretheral adhesions binding these portions of the ureter toward the middle line of the body, thus deviating these parts of the ureter from their normal situation and course. With this diagnosis in mind, the operation was advised, which was willingly acceded to by the patient so long as, in her words, she would be no longer bothered by micturition.

The technic of the operation was as follows: A left lateral incision across the abdomen was made beginning from a point 2 to 3 centimeters below the lowermost part of the left costal arch and corresponding to the external border of the left rectus abdominis muscle, downward toward the anterosuperior iliac spine to a point about 2 to 3 finger-breadths from it, and then curving inward and slightly downward toward the median line of the abdomen and distant about 3 to 4 finger-breadths from the iliac spine. The incision was deepened, cutting through the oblique muscles. A haemorrhage, produced by severing the epigastric vessels, was controlled by clamp and ligature; then the fascia transversalis was carefully cut and separated from the parietal peritoneum, to avoid opening or injuring the peritoneal serosa. The peritoneum of the posterior abdominal wall was carefully rolled in with the fingers toward the median line of the abdomen, starting from the external iliac fossa, and when the external iliac artery was exposed this vessel was used as a guide in looking for the bifurcation of the primitive iliac at which level, on account of its hard feeling, the ureter previously catheterized was easily found. A portion of the ureter was localized in this way, and was traced upward and downward to appraise its course, and it was found to be surrounded by adhesions binding it toward the central side of the body. After carefully loosening up these adhesions along the extent of the middle and lower thirds of the ureter, I was finally able to lift up these portions of the duct and to bring them up through the wound. When the loosening up of the adhesions was completed and the ureter permitted to remain in its normal position, after removing the catheter, the closure of the wound was ac-

complished layer after layer; a cigarette drainage was inserted in the lower portion of the wound. A few days after the operation, it was noted that the patient was no longer troubled either by micturition or pollakiuria, and the average urination was only five or six times in twenty-four hours, which is about normal.

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## ILLUSTRATIONS

[Plates 1 to 4 are drawn from photographs taken at different stages of the operation. All plates are arranged head up. The following letters have the same meaning on Plates 1 to 4: *a*, ureter; *b*, gauze impeding the ureter; *c*, retractor; *d*, muscles; *d'* muscles retracted; *e*, cavity left after rolling in of the peritoneum from the parietal wall of the abdomen; *f*, cigarette drainage inserted before completely closing the wound.]

### PLATES 1 TO 4

Operation for the external liberation of the pelvic and iliac portions of the ureter.

### PLATE 5

Showing the condition of the upper third of the ureter after collargol injection.

### PLATE 6

Showing the upper third of the ureter containing the collargol solution and the middle and lower thirds of the ureter completely devoid of the solution.

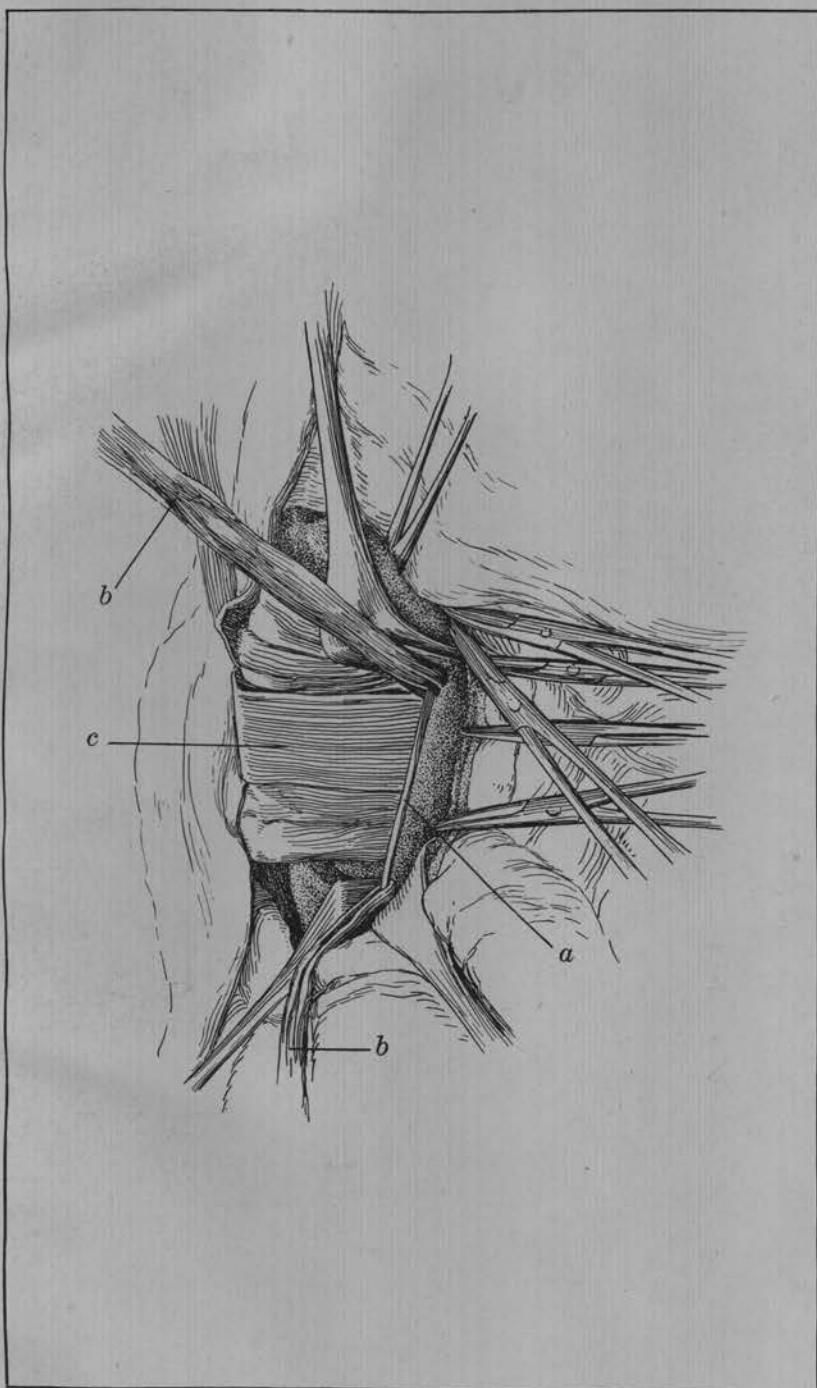


PLATE 1.

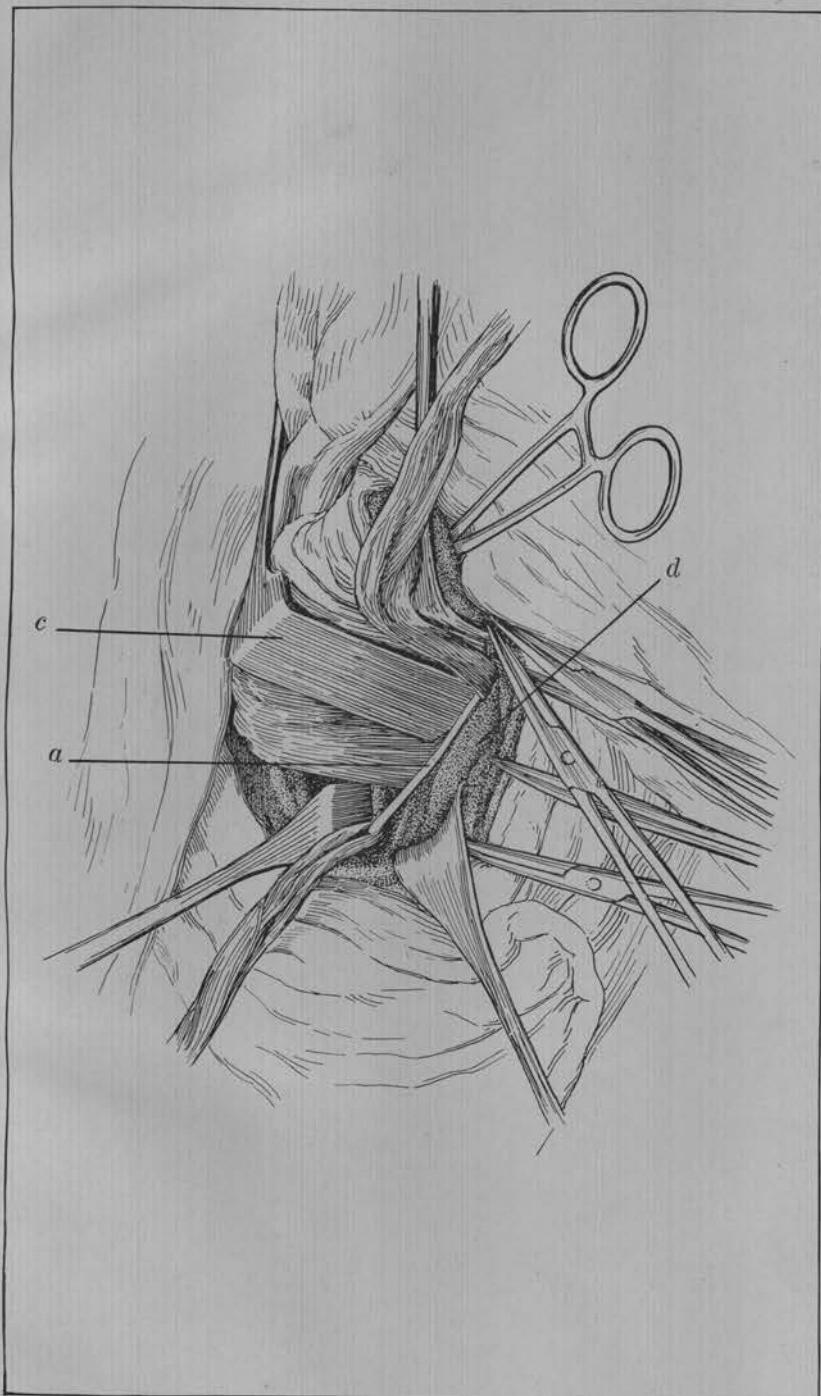


PLATE 2.

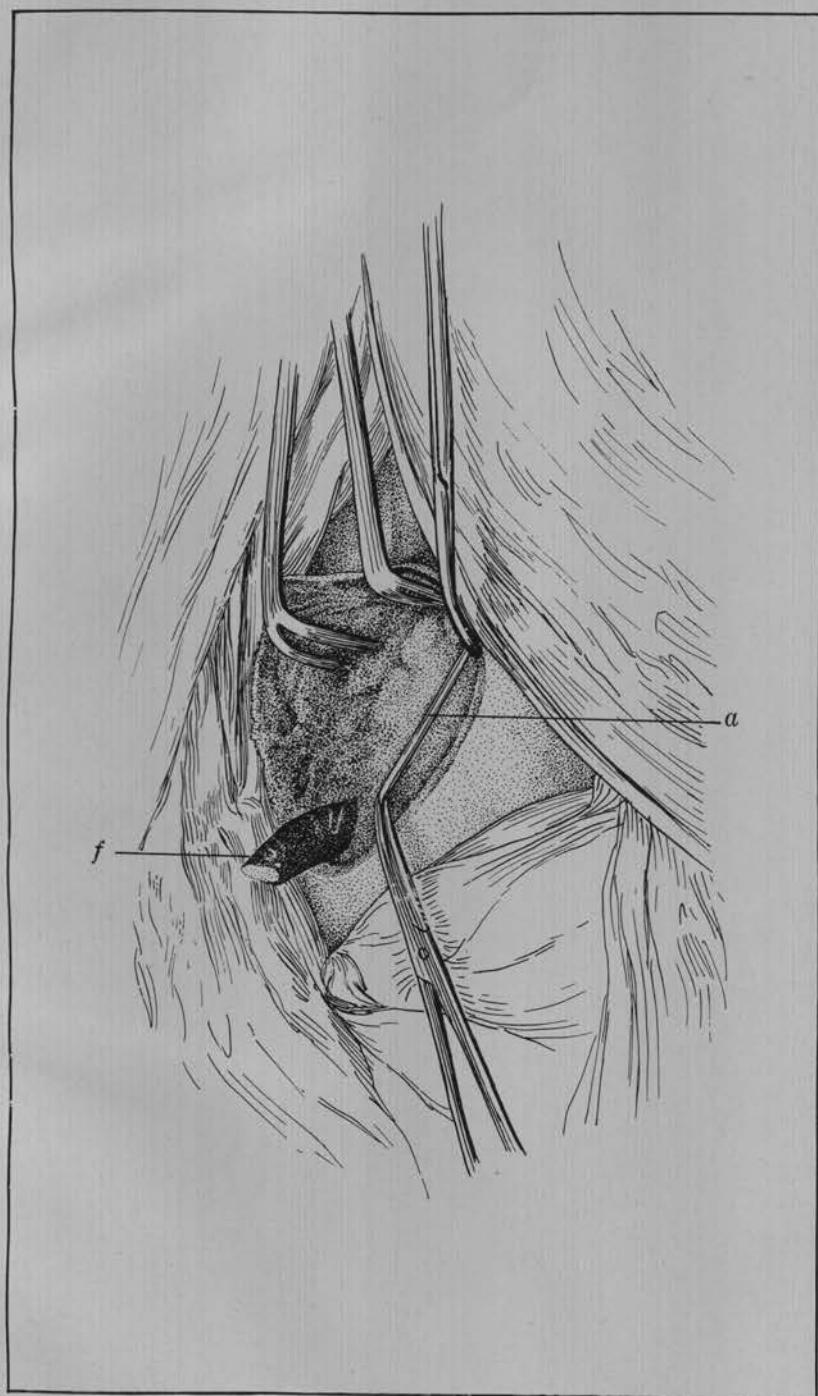


PLATE 4.

EDUQUE: POLLAKIURIA.]

[PHILIP. JOURN. SCL, 17, No. 1.



PLATE 5.

EDUQUE: POLLAKIURIA.]

[PHILIP. JOURN. SCI., 17, No. 1.

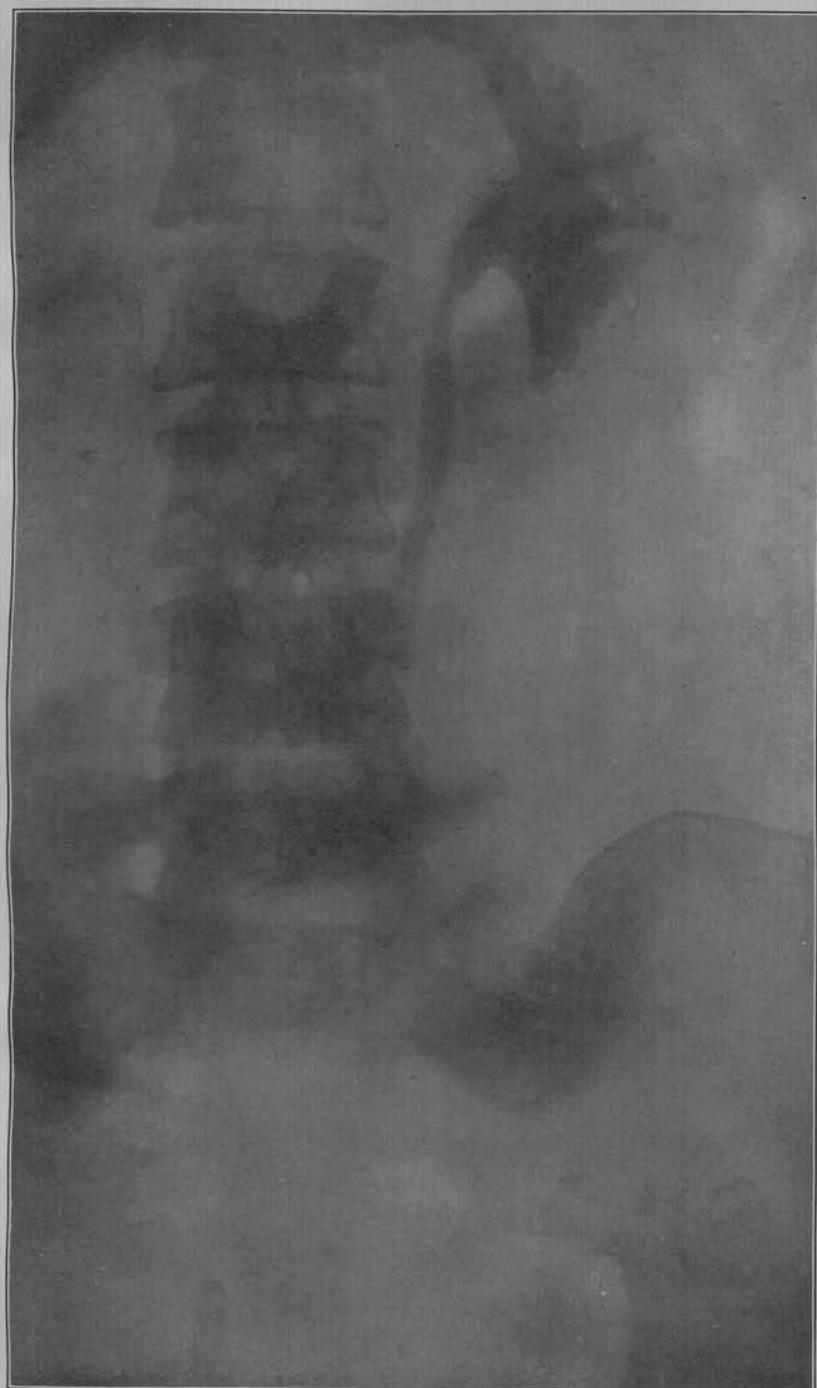


PLATE 6.

INFORMAL PRESENTATION OF TWO UROLOGICAL  
CASES: ONE A DIVERTICULUM OF THE BLADDER,  
AND ONE A LEFT RENAL CALCULUS COMPLI-  
CATED BY PYELITIS

By Capt. Ivy A. PELZMAN  
*Medical Corps, United States Army*

DIVERTICULUM OF THE BLADDER

James A. Sommerville, civilian employee, Quartermaster Corps, age 58.

Previous personal history: Negative, except for usual diseases of childhood.

Venereal history: Negative.

*History of present condition.*—The patient was first admitted to the Department Hospital on April 22, 1918. At that time his chief complaint was frequency of urination, burning pain on urination, and a bearing-down pain over the bladder region. He voided two or three times an hour during the day, and would have to get up as often as ten to twelve times during the night. He was placed on bladder irrigations and given urotropin internally, and after nine days in the hospital was discharged as slightly improved.

One month later he was readmitted complaining of a recurrence of the symptoms; he was in the hospital two weeks this time, and was again put on bladder irrigations and urotropin, and again discharged as improved.

Two days after discharge from the hospital he returned for his third admission with another recurrence of the acute urinary symptoms.

The diagnosis made during these various admissions was hypertrophied prostate and cystitis, acute, cause undetermined. Laboratory findings: Wassermann, negative; examination of prostatic secretion and sediment from urine, negative for gonococci; urinalysis showed marked reaction for albumin; microscopically, many pus cells; otherwise negative; stool and blood examinations, negative.

During these admissions he was not cystoscoped, nor was he X-rayed.

On July 24, 1918, the patient was transferred to Letterman General Hospital for four months; diagnosis of hypertrophied prostate and fungus growth of the bladder was made (this without a cystoscopy). An operation was advised, but it being explained to the patient that the operation was a very serious one he refused operation and returned to Manila, in February, 1919.

During his stay at the Letterman General Hospital he had daily bladder irrigations and was on urotropin internally. On admission his weight was 106 pounds and at the end of his four months' stay under good diet, rest, and daily bladder irrigations his weight increased to 140 pounds.

In August, 1919, the patient first came under my care with the past history as just given. Rectal examination showed a markedly enlarged prostate.

On cystoscopy an acute cystitis was found, the inflammation involving the entire bladder wall. The cystitis was so marked that it required four or five bladder washings before a clear field could be obtained. The ureteral orifices were easily located and were found to be normal. Slightly external to and about 2 centimeters above the left ureteral orifice was found the opening of a diverticulum. A ureteral catheter (X-ray) was passed into this opening and it was found that the catheter curved up within the diverticulum. The opening into the diverticulum was about 1 centimeter in diameter. An X-ray picture was taken and with the catheter still within the diverticulum 10 per cent collargol was injected into the diverticulum and another X-ray was made.

At the first cystoscopy the maximum bladder capacity was 50 cubic centimeters of bladder fluid, and it was with great difficulty that a satisfactory cystoscopic examination was made. The residual urine amounted to 60 cubic centimeters. This urine was very turbid and had an extremely foul odor.

The patient has been on daily bladder irrigations of boric acid and silver nitrate, the latter in increasing strength. He has shown marked improvement in both general and local condition. His present weight is 140 pounds; his appetite is good; his bladder capacity at present is 140 cubic centimeters, as compared to 50 cubic centimeters when treatment was first started. Cystoscopically his bladder has shown marked im-

provement. The cystitis has practically entirely disappeared; the diverticulum, however, is still present. Where previously he would void two or three times an hour, he now can go from one hour to one and a half hours without voiding; at night he gets up to void two or three times instead of ten or twelve times. The patient has shown marked improvement, but of course will not be permanently cured unless prostatectomy and dissection of the diverticular sac be done. To date he has refused operation.

Diverticulum of the bladder is more prevalent than was formerly supposed, the present more frequent discovery of the condition being due to the fact that an absolute diagnosis is impossible without the aid of the cystoscope or the X-ray, although occasionally a fairly accurate diagnosis may be made by exclusion.

The etiology of bladder diverticulum is still sub judice. Some contend that this condition is always acquired, basing the contention principally on the presence or absence of muscular fibers in the sac. The probability is that a certain percentage of the cases is congenital; or rather, there probably is a congenital defect in the bladder wall which, under given conditions, acts as a predisposing cause to the development of the diverticulum.

The majority of urologists believe' that diverticula are acquired. They base this contention on the fact that diverticula are scarcely ever found in the very young, but that, for the most part, they occur in persons past middle life, at which time obstructions to the urinary outlet most frequently occur.

As yet no experimental data have been offered to prove any theory thus far advanced; and, until some unassailable proof can be furnished, the exact etiology of diverticula will remain unsolved.

*Symptoms.*—Frequent urination with inability to empty the bladder completely is one of the commonest signs of the presence of a diverticulum. In most cases this does not cause any special annoyance until infection and cystitis develop, when the patient seeks advice because of the pain accompanying these conditions. Occasionally there is a burning or stinging sensation during and after micturition. If the diverticulum be infected, and in most cases it is, the urine even after repeated irrigations is cloudy and, in a great many cases, very fetid.

*Diagnosis.*—The presence of diverticula can nearly always be determined by the cystoscope in the hands of a person ex-

perienced in its use, but may be easily overlooked by the inexperienced. A diverticulum opening is sometimes so very small that it looks like a dark speck in the field. This apparently insignificant speck, however, may be the opening into a very large sac. The cystoscopic examination may be verified and the size and exact location of the diverticulum determined by the injection of collargol or other silver preparation, followed by an X-ray of the bladder region.

**A CASE OF LEFT RENAL CALCULUS COMPLICATED BY PYELITIS  
CAUSED BY BACILLUS PYOCYANEUS**

*Case.*—H. G. E., wagon master, age 42.

*Personal history.*—For the past three years has had pains in left kidney region. These attacks occurred on an average of once a month and would last from a half hour to twenty-four hours. Attacks were severe and would radiate down to left groin; urination and hematuria frequent during an attack.

During the past ten months has been observing urine at intervals of two weeks. After an attack of pain would pass, he would notice eight or ten small calculi; the urine would be dark-colored at this time.

*Past history.*—Two weeks before admission had chills and fever, and slight pain in left renal region. Complains of loss of appetite, nausea, and vomiting. No frequency of urination, no burning pain. Urine was dark-colored and very turbid.

Cystoscopy showed mild degree of cystitis involving the entire bladder wall, the ureteral orifices apparently normal. Ureteral catheters, passed to both kidney levels, met no obstructions. X-ray of genitourinary tract, with X-ray catheters in situ, was negative for calculi. Examination of urine from left kidney showed many pus cells and the presence of *Bacillus pyocyanus*. Repeated examinations verified these findings and showed that the finding of *Bacillus pyocyanus* was not due to contamination. An autogenous vaccine was made from the pus obtained from the left kidney, and eight injections of this vaccine were given at intervals of four days; previous to the giving of the autogenous vaccine the patient ran a very septic course, the temperature varying from 97° F. to 105° F. The autogenous vaccine was given after this septic temperature had continued for three weeks. On the day of administering the first injection the temperature was 103.2° F.; with each succeeding injection of the vaccine the temperature declined toward normal until the end

of the eighth injection, when the temperature reached normal and continued at normal.

This case is of interest, first, because of the cure by the administration of the vaccine; secondly, because of the organism causing the pyelitis. This is the fifth case of a series found in the past six months at the Department Hospital, in which *Bacillus pyocyanus* was the causative agent of infection in the genitourinary tract.

## STREPTOCOCCUS HEMOLYTICUS: A CASE STUDY

By First Lieut. HARRY G. JOHNSON

*Medical Corps, United States Army*

The following case is reported in order to record a few of the manifestations of the streptococcus hemolyticus. I am submitting this for your approval or disapproval, at the suggestion of my senior officers. I hope it will carry a little of interest. It has no claim whatsoever to any scientific value.

The case is that of a man about 30 years of age, a Serbian by birth, and said to have been at one time an officer in the Medical Corps of the Serbian army. He had been under the care of the psychiatric service for some time as a case of dementia praecox, having the usual manifestations of negativism, necessitating at times tube feeding.

At the time this case entered the medical wards, we had been having an epidemic of diphtheria and streptococcic sore throat; so it was the rule to have a morning and afternoon routine examination of the throats of all psychiatric patients. This case was discovered to have a suspicious throat and had been immediately transferred to the medical service. The family and past history have no bearing on the case from the standpoint under consideration.

The physical examination at the time of admittance revealed a poorly nourished man, uncoöperative, and in a semiconscious state. The temperature, as recorded, was 102°; pulse, 90; respirations, 20. Head, negative; pupils, equal and reacting; chest, clear; and abdomen, negative. The genitourinary tract was apparently normal. Rectum revealed no hemorrhoids or other disease. The reflexes were present but sluggish. The patient had no skin abrasions. Examination of the mouth and nasopharynx showed the teeth to be in poor condition, the pharyngeal wall hyperæmic and oedematous, the uvula injected and both tonsils swollen. The tonsils and a small part of the posterior pillar of the right tonsil were covered with a thin, translucent, grayish membrane, which wiped off readily and did not bleed.

As mentioned before, the hospital had been having an epidemic of diphtheria, which at this time was being replaced by sore throat of streptococcus origin. Many of the diphtheria cases, as proven by bacteriological findings, were of a very atypical character, and many cases proven not to be diphtheria had many of the local manifestations of the disease. It may be said here that, in not a few diphtheria cases, no membrane was present, the throat showing only marked œdema and congestion. We soon found that a very reliable early sign in diphtheria was œdema of the uvula. Some cases resembled a mild follicular tonsillitis, but in these cases the cervical adenitis was usually prominent. On the other hand the streptococcus throat often resembled that of diphtheria, frequently a thin membrane being present over the tonsils; but very rarely did we find the membrane extending to the pillars, as was the case in diphtheria.

In the case under consideration, the local process manifesting itself as described in the throat, and being guided by the apparent toxemic condition of the patient, 22,000 units of diphtheria antitoxin were administered, after first endeavoring to desensitize the patient. The following day the report on the throat culture was returned from the laboratory. It showed streptococcus in nearly pure culture, which was later demonstrated to be a strain of the streptococcus hemolyticus. Blood count showed erythrocytes, 4,500,000; white count, 14,000; polymorphonuclears, 75 per cent; hemoglobin, 82 per cent. The temperature was not unusual.

On the afternoon of this day, the patient had a severe chill which was followed by a condition of clonic convulsions, lasting about an hour. Blood culture was taken, and spinal puncture performed. The spinal fluid was clear and showed a normal cell count and negative globulin. The local manifestations in the throat were somewhat improved, and continued to improve throughout the disease. No ulceration or deep-seated involvement occurred.

The next day the condition of the patient was very much worse. Toxic symptoms were pronounced. The temperature reached 104° and showed marked remissions. The leucocyte count was 17,000. The blood culture was reported to have a growth. This growth was later proven to be streptococcus, and in such quantity as to fill nearly one-quarter of the flask.

The case now resolving itself into a bacteræmia and septicæmia,

the usual treatment of elimination, and alkaline and glucose per rectum were started. In addition, Parke Davis polyvalent anti-streptococcus serum was given in 100 cubic centimeter doses every four hours, both intravenously and subcutaneously. About this time the patient was again searched for a possible focus other than in the throat, but none was found. The genitourinary tract and rectum were very closely studied, but found apparently free from disease.

The administration of the serum was continued at four-hour intervals for some days, and persisted in at longer intervals throughout the disease.

Blood cultures were taken every other day, and the second culture showed a diminution in the amount of growth. The leucocyte count on the fifth day was 22,000, with polymorphonuclear cells, 82 per cent. Here was recorded the first metastatic involvement. The metatarsophalangeal joint of the great toe of the right foot became very red and swollen, and on the following day presented signs of pus. The joint was opened and a small quantity of seropurulent fluid obtained. This was sent for culture.

The same day the left knee became involved, and this went on rapidly to suppuration. The joint was opened and the pus evacuated. This also was sent for culture. Other joints followed in rapid succession. Nearly overnight, a previously well joint would give signs of pus and have to be opened. The right knee, left ankle, left elbow, left knee, right wrist, right elbow, and right sacroiliac joints were all involved, and were opened and the pus cultured. A pure culture of streptococcus was obtained from the exudate from all the diseased joints. At first the exudate was of a thin seropurulent material, but this soon changed to a thick bloody pus.

All the incised joints were irrigated with Dakin's solution. Involvements followed each other so rapidly that after the eleventh day no new involvements occurred. The joints all continued to drain pus, and in those first affected distinct crepitation was obtained. On the twelfth day, the right parotid gland became involved and progressed rapidly to a suppurative parotiditis, draining spontaneously through the external ear.

During this time the blood cultures showed less and less growth until only a faint growth was obtained. Each culture showed the same organism. The temperature dropped and hovered around 102°. The general condition of the patient was

apparently improved, and he was voluntarily taking nourishment. His mental condition had markedly changed, he now being seemingly rational and coöperative.

The blood cultures showing a diminishing growth, and with the apparent improvement in the general condition of the patient with no new involvements recently having occurred, it was thought that the infection had pretty well localized itself; so it was deemed advisable to stimulate antibody production by the administration of an autogenous vaccine. This vaccine was duly prepared and an initial dose of 2,000,000 given, and a second dose of 4,000,000. The serum was continued as before. About eight hours after the last dose of vaccine, the temperature suddenly rose to 104°, the pulse became very rapid, and the patient was in extreme condition.

The following morning, signs of fluid were demonstrated in the right chest and proven by aspiration. The fluid showed streptococcus. The next day, pus was obtained from the left chest. This also showed streptococcus.

Upon examining the patient the next morning, about the seventeenth day of the disease, a large swelling was noted over the anterior aspect of the left chest, extending from the upper border of the seventh rib to the nipple, and laterally from the edge of the sternum to 2 centimeters inside the anterior axillary line. This mass was about the size of a small grapefruit, and in it a distinct fluctuation was obtained.

An impulse was also distinctly evident in the mass, synchronous with each heartbeat and was transmitted all through the mass. The area of cardiac dullness, and the dullness in the mass, and the fluid in the right and left chests, all merged together. The heart sounds were barely audible. A diagnosis of a large pericardial effusion was made. A needle was inserted through the skin over the mass and pus obtained. The surgeon, from this evidence, considered the condition to be that of a large superficial abscess and advised incision, which was performed in the sixth interspace about the nipple line. Approximately 200 cubic centimeters of pus were obtained. The abscess evacuated itself in spurts, and each spurt apparently corresponded to each heartbeat. The incision was enlarged and the cavity explored, with the result that an irregular hole, about the size of a fifty-cent piece, was discovered through the intercostal muscles in the fifth interspace about the location of the costochondral junction of the fifth rib, which was necrotic.

The opening led directly into the pericardial cavity, and by

inserting the finger into the same, the apex of the heart was felt distinctly under the finger. Reflex light thrown into the aperture revealed the apex of the heart to full view. A similar opening existed in the interspace. The parietal layers of the pleura and pericardium were adherent to themselves and adherent to the chest wall. A sinus existed between the pericardial cavity and the outside of the chest wall. A large purulent pericardial effusion, rapidly formed, had ruptured through the intercostal muscles spontaneously and had caused necrosis of the costochondral junction of the fifth left rib, and by means of the incision made through the skin an opening now existed from the exterior to the interior of the pericardial cavity. The patient lived three days in this condition. He died on the twentieth day.

Through some misunderstanding only a partial autopsy was performed, which demonstrated the pericardial sinus as described, and a condition of the joints in which the joint surfaces eroded until the bare bone ends lay in direct apposition. Pus was obtained from the peritoneal cavity and from the spinal canal.

This case was followed by another, with the primary infection in the lungs, which was demonstrated to be streptococcus hemolyticus and went on to the same fatal termination, developing all the severe involvements with the exception of the pericardium and joints.

This particular type of streptococcus played a large and important part in the causation of post measles and influenza pneumonia, at the army cantonments during 1918. The infection is usually a local process, but in some cases it may be a primary septicæmia.

The pneumonitis caused by this organism, occurring either primarily, or secondary to some predisposing disease, is of a peculiar and characteristic type. It is particularly fatal and prone to complications, the most common of which is empyema. In general, it may be said that streptococcus hemolyticus produces a bronchopneumonia affecting primarily the framework of the lungs and bronchial walls. The name interstitial pneumonia has been suggested, and it describes the condition. It is more or less associated with a diffuse or patchy lobular pneumonia. The bacteria can be found scattered in the alveolar exudate. Areas of this kind may, and frequently do, become confluent, and resemble a lobar pneumonia.

As shown by Tongs, the tonsils, especially the hyperplastic ones, are a frequent breeding place for the hemolytic strepto-

coccus; but a complete tonsillectomy appears to be followed in most cases by the absence of the streptococcus from the throat.

Of the complications, empyema is the most common; septicæmia is not uncommon; pericarditis, multiple arthritis, and multiple abscesses may occur. Meningeal involvement was demonstrated in both cases recorded.

Hamilton and Havens have reported work which they have done with this organism and which gives promise. They claim to have studied many strains, which could be grouped in a few definite types. They report that they have found at least four groups, which were fairly distinct. These authors say:

These groups are obtained by the serological reactions of the different strains, since the cultural characteristics have no relation to their immunological groupings. The serum of rabbits immunized with a strain of hemolyticus, protects mice against infection with a homologous strain, but not against strains which are serologically different. But certain "Master" strains can be isolated, by their serological reactions.

The suggestion is made that these strains may be used in the production of a serum for therapeutic use.

Certain differences between the hemolytic and nonhemolytic strains have been noticed. There is a tendency for the hemolytic strains to preserve the classical arrangements in chains made up of distinct cocci, and not to appear as chains made up of diplococci. The power actively to invade the body, exhibited by the hemolytic strains, which frequently produces epidemics, is not shared by the nonhemolytic strains.

#### CONCLUSIONS DRAWN FROM OUR CASES

1. That the local manifestations in the throat were due to the streptococcus hemolyticus.
2. That there existed a true bacteræmia, septicæmia, and pyæmia, with primary focus probably in the throat.
3. That the streptococcus was isolated in pure culture from the exudates.
4. That there was apparent predilection of the streptococcus for all serous membranes and the extremely rapid development of pus.
5. That the serum at times appeared to have some beneficial results, but by laboratory experimentation with the serum against the culture from the patient, it was proven to have no serologic reaction.
6. That the autogenous vaccine was absolutely contra-indicated, and was only "adding insult to injury."

## CLINICAL STUDIES ON ENCEPHALITIS LETHARGICA

By Drs. P. LANTIN and W. VITUG

An unfamiliar malady was observed in the clinics of the Philippine General Hospital in the latter part of 1919. This unusual disease we refer to was the so-called encephalitis lethargica.

In reviewing the available statistics about outbreaks of this disease we found that, as early as 1712, encephalitis lethargica was observed by Camerarius in Tubingen; later it was reported in 1890 in Austria-Hungary and in northern Italy, where it received the name of encephalitis lethargica nona; lastly, in 1917, it was reported in Vienna by Von Economo. Since this last report, the scientific journals coming from Europe and the United States have brought numerous accounts concerning the disease.

Our observations on this disease have been very limited, and are based on only eight cases. The cases were all Filipinos, adults, consisting of two females and six males. Three cases were admitted in September, and five in October, 1919.

*Symptomatology.*—Encephalitis lethargica has many varieties of onset; the prodromal symptoms, however, in our cases point to involvement of the central nervous system. Some observers state that in many cases the disease starts with malaise and catarrh, involving the nose and pharynx, accompanied by slight cough. Some of our cases gave similar history. Our first case started with pain in the eyes, and severe headache, first localized in the frontal region, spreading afterwards all over the head. The second case began with pain in the shoulder. The third case began with choreic movements in the muscles of the face and extremities. The fourth case began with pain in the molar teeth, radiating to the head, accompanied by difficulty in swallowing, dyspnoea, palpitation, and restlessness. The remaining four cases began with heaviness in the head, gradually increasing, accompanied by headache, blurring of vision, vertigo, and general weakness. Fever and diplopia set in.

After from one to three days of fever and diplopia, stupor occurred. The patients slept most of the time, and could be

awakened only with difficulty, answering questions intelligently, but slowly. Strabismus was usually present. Frequent involuntary twitching of the muscles of the face, neck, and extremities was observed. Supraorbital nerves were usually tender. Areas of hyperesthesia were elicited in many cases. The neck was not rigid, and Kernig's sign was absent; if present at all, it was usually very slight. In all the cases there was marked conjunctival injection. There was irregularity of the pupils, and they reacted slowly. The tongue was coated; the appetite, poor; bowel movements, constipated in most cases. Heart and lungs were apparently normal; liver and spleen, not palpable; knee reflexes, apparently normal. Slight leucocytosis with increase of polynuclears was present in the blood. Cerebrospinal fluid was clear and came out in drops; differential counts showed increased cellular contents; the highest count reached 77 per cubic millimeter, usually with predominance of polynuclears, rarely with small lymphocytes.

*Clinical course.*—The fever was remittent, sometimes intermittent, ranging from 37.5° C. to 38.5° C., rarely over 38.5° C. It lasted from four to twelve days and averaged six days. The patients gradually became stuporous, sleeping most of the time. In severe cases, deep coma set in with attacks of convulsions which continued until the patient died.

During the convalescent period we frequently observed transient rise of temperature, with the mind still unclear and speech slow. In all our cases there was accompanying general weakness and, at times, slight palpitation. Heaviness of the head persisted over a long period. In those who recovered no paralysis was observed.

Three important clinical symptoms are characteristic of encephalitis lethargica; namely, fever, diplopia, and stupor. They are regarded as the triad of symptoms of the disease, and when the triad is incomplete, the diagnosis is very difficult. In the majority of our cases, we observed symptoms of involvement of the third nerve, more than of any other cranial nerve. Pothier states that the fourth, sixth, seventh, ninth, tenth, and twelfth nerves were said to be affected. Marinesco, of Bucharest, states that the motor cranial nerve nuclei are involved, while the sensory nuclei escape.

*Mortality.*—Four out of our eight cases died, giving a mortality rate of 50 per cent. The French mortality rate is given as 50 per cent. Only three of our cases were autopsied, and the pathological findings showed characteristic lesions of the disease.

## XEROPHTHALMIA IN FOWLS FED ON POLISHED RICE AND ITS CLINICAL IMPORTANCE

By Drs. L. E. GUERRERO and I. CONCEPCION

In 1909 Stepp for the first time deduced from his experimental work on rats that certain fatty substances, or some substances soluble in fats, were very essential to the maintenance of life and the growth of the organism. In 1913 McCollum and Davis, and Osborne and Mendel demonstrated that, in addition to proteins, carbohydrates, fats, and mineral salts, certain accessories, or complementary substances, were necessary for the proper nourishment and growth of the body. These accessories are two in number, and McCollum and Kenedy named them provisionally "fat soluble A" and "water soluble B".

Fat soluble A exists widely in animal and plant tissues. It has been found in butter fat, egg fat, beef fat, cod liver oil, the testes of codfish, the kidneys, liver and liver oil of pigs, in oleomargarine, fish fats, fish oils, dried unsweetened condensed milk, corn, wheat, rye, oats, plant leaves, cotton flour, cottonseed oil, flax seeds and millet seeds, soy beans, peas, and bananas. It is absent or present only in insignificant amounts in lard, pig's heart, pancreas, thymus and adrenals, olive oil, almond oil, linseed oil, corn oil, and in the oils of sunflower, soy beans, wheat, cottonseed, nut margarine, vegetable margarine, white beans, barley, and potatoes. It can be isolated from the animal tissues with ether, chloroform, benzine, and acetone. However, in order to isolate it from plants it is necessary to treat the mother substances with these solvents, and then extract it from the residue with hot alcohol.

McCollum and his coworkers have shown, by numerous experiments on rats fed on different mixtures of various purified food products, that the absence, or insufficiency, of fat soluble A from the food caused in these animals marked general malnutrition and oedema of the eyes which, on prolonged feeding, terminated in complete blindness and in the death of the animals. They have often averted and overcome xerophthalmia by placing the animals on any of the above-mentioned foods rich in fat soluble A.

McCollum and Simmonds believe that there are only two diseases caused by deficiency, in the sense that Funk uses the term; namely, polyneuritis and a condition characterized principally by retarded growth, malnutrition, and xerophthalmia consisting of edema of the eyelids, corneal opacity, and purulent secretion. They are due to inadequate quantities of water soluble B and fat soluble A, respectively. According to these authors scurvy, pellagra, and rickets are not due to lack of specific vitamines in the foods as formerly believed by Funk, but to an unbalanced diet.

In our work on the biologic assay of the different tikitiki extracts made in Manila, we have observed blindness associated with marked cachexia in the controls and the test fowls. All five controls, which were fed exclusively on polished rice, developed polyneuritis—one with blindness, but it lived for more than one hundred days.

Of the thirty fowls which received polished rice and 5 mils of tikitiki extract daily, five developed polyneuritis, and seven developed xerophthalmia and died. Xerophthalmia appeared in these animals from the seventh to the seventy-ninth day of the experiment.

From these experiments we may deduce:

1. That polished rice is lacking not only in water soluble B which prevents polyneuritis, but also in fat soluble A which presides over the processes of growth and prevents the occurrence of xerophthalmia.
2. That tikitiki extract contains the water soluble B, but does not contain the fat soluble A.

McCollum and Davis have shown, in their experiments on rats, that rice polishings, which contain most of the fat, do not contain the fat soluble A; or, if they do contain it, it is in such insignificant amounts as to be insufficient to promote growth in these animals.

In later experiments, we shall endeavor to determine whether fat-soluble A is present or not in unpolished rice, using fowls instead of rats as our experimental animals. We are under the impression that unpolished rice contains this growth-promoting factor, for otherwise we can conceive of no reasonable explanation of the fact that chickens confined in cages for prolonged periods of time and fed on nothing but unpolished rice could live and remain in apparently perfect condition. We suppose that this is also the explanation of the common practice in the Islands of fattening chickens by keeping them confined in very

narrow cages that prevent all movements except those of the head and neck. Fowls so confined fatten quickly if fed liberally on unhulled rice or corn.

The discovery of fat soluble A is of practical importance, because it elucidates certain clinical manifestations which until now have remained unexplained, or have been attributed to other causes.

Mori, in 1904, published his observation on a disease found in Japan and known in that country by the name of *hikan*, characterized principally by diarrhea, bulimia, cachexia, marked dryness of the skin and hair, and xerophthalmia. The course of this malady is chronic; it is rarely fatal. Death is usually due to septicemia, following the cachexia or the eye complications.

Hikan is a disease of second infancy, generally occurring in the dry season, in children between the ages of 2 and 5 years, and rarely in breast-fed children or in adults.

During a period of about three and a half years, Mori was able to study 1,511 cases among 45,162 patients. He claims that hikan is not found among the fishermen, but usually among the poor who live chiefly on vegetable diet. He believes that this ailment is caused mainly by deficient absorption of fats, and that cod liver oil, chicken livers, eel fat, and the oil of sesame possess unusual curative properties which bring about rapid disappearance of the symptoms.

Very recently Bloch reported from Copenhagen forty cases of necrosis of the cornea with ulceration, in children fed with skimmed milk. Of these cases, only five presented xerosis; twenty-seven, keratomalacia of both eyes; and seven, keratomalacia of only one eye. The patients, all of them children varying in age from a few months to 1 year, showed evidence of atrophy and dystrophy; the tissues appeared soft and oedematous, the emaciation was sometimes masked by the oedema; and in a few cases only weakness and pallor were observed; but in all the cases, there were marked evidences of retarded growth, and the skin was dry and was covered with a furfuraceous desquamation. The little patients lay, quiet, in profound apathy. They objected when disturbed, but remained quiet if let alone. He attributes the cause of this syndrome to insufficient intake of fats.

The majority of his cases occurred during the war; twenty-eight came from rural districts, and only eleven were from the city. The serious cases from the rural districts were fed on centrifuged milk, and this class of cases has been progressively

increasing during the subsequent year. These patients received the cheapest kind of milk, which naturally contained very little fat. His treatment consisted only in breast-feeding, cod liver oil, and local treatment of the eyes. For older children he prescribed milk mixtures in addition to the oil. He calls attention to the fact that the lesions of the eyes may often be masked by a conjunctivitis, and that it is very probable that many cases of blindness and leucoma in the adult had their origin in an overlooked xerosis during infancy. The whole trouble, according to this observer, can be readily overcome by simply changing the diet to breast-feeding, and giving cod liver oil, the latter with or without sweetened whole milk.

Czerny and Keller, and recently Bloch, observed similar cases in children fed exclusively on carbohydrates.

Morand believes that the cause of this trouble is not entirely due to fat deficiency, as claimed by Bloch. After examining the records of his service, he found that two hundred five infants with fat-dyspepsia had been kept on a fat-poor diet for over two months without developing symptoms that might indicate disturbances from fat deficiency. He attributes the cause of xerophthalmia not so much to fat deficiency as to the pasteurization of the milk used. He mentions five infants with fat dyspepsia, complicated with pyuria, otitis, and pyodermitis, that were kept on a fat-poor diet, and that developed xerosis of the conjunctiva and showed no sign of growth. Up to a few months previous to illness these children were receiving raw milk; but, owing to a change in the management of the dairy, they had to be fed with pasteurized milk, which is in reality a denatured food and deficient in vitamines.

In order to show that pasteurization of the milk was the real cause of these disturbances, Morand continued to give these children the same nourishment, plus 10 mils of fresh milk before each feeding. This small quantity of fresh milk caused rapid disappearance of the xerosis. He believes that the success obtained was due to the vitamines and not to the small amount of fats contained in the 10 mils of fresh milk.

Ronne, an ophthalmologist, has also observed cases of xerophthalmia in children fed on casein and little carbohydrates. According to him the serious symptoms as well as the xerophthalmia come on suddenly, a fact which in his opinion suggests that the lack of vitamines is the real cause of the disturbances, for 'excessive' carbohydrate diet could hardly produce such a sudden and stormy onset of the disease. He further affirms

that xerophthalmia, when allowed to run its natural course without treatment, always terminates fatally. However, he has never seen a rapidly fatal case of carbohydrate-dyspepsia without xerophthalmia. He believes that the immediate cause of death is the loss of the resistance of the patient, and that there are evidences to sustain the theory that both the carbohydrate-dyspepsia and the avitaminosis contribute to the fatal termination of these cases. According to him, xerophthalmia is often, but not always, of dietetic origin. It is also found in tuberculous patients where the xerophthalmia appears to be due not to defective diet but rather to the inability to assimilate the accessory elements found in the food. There seems to be individual power of assimilation, as there are children who apparently do very well on a diet that in others would bring about serious xerophthalmia.

Before closing, we wish to call the attention of medical practitioners, and especially pediatricians and ophthalmologists, to the possibility of meeting in their practice similar cases, especially among the children of the poor, who are weaned early and placed on a rich carbohydrate diet. We should look for these cases in Manila, where the use of skimmed milk in the treatment of gastrointestinal troubles is becoming generalized.

## THE DUNHAM FAN IN ROENTGENOGRAMS

By First Lieut. PAUL S. SEABOLD

*Medical Corps, United States Army*

Without doubt, the factor most necessary in making a roentgenological diagnosis of pulmonary tuberculosis is a thorough knowledge of the finer anatomy of the lung. According to the most recent work of Dunham, of Cincinnati, we find that tuberculosis, from both an etiological and a pathological standpoint, is more fully explained.

Taking up the bronchial tree and going immediately to its most distal divisions, the respiratory bronchi, we find connected with these are many small alveoli known as the alveolar ductules, which in turn are again connected with the irregular atria. Emptying into the atria are the alveolar saccules, on all parts of whose circumference are found the pulmonary alveoli. The last division of the bronchial tree, before breaking up into the parenchymatous tissue of the lung, is the alveolar ductule; we consider it and all the air passages connected with it to be the primary lobule of the lung, the combination of great numbers of these making up the secondary lobule of the lung, which in turn makes up the bulk of the lung.

The blood vessels to be considered are the pulmonary and the bronchial.

The bronchial artery gives off its branches to the bronchi, connective and lymphoid tissues, also supplying the lymphatic glands at the hilum. This artery extends to the pleura by way of the thick connective tissue, giving blood supply there to the walls of the lymphatics.

The pulmonary artery follows the bronchial tree to its finest divisions, finally dividing into as many branches as there are atria.

The bronchial veins are only found at the hilum where they empty into the vena azygos, while the pulmonary vein starts from the fine venules in the pleura and at the distal end of the alveolar ductules from the mesh of the pulmonary capillaries.

The lymphatics form as a thick mesh in the walls of the bronchi which communicate freely with those of the pulmonary

artery. Those of the pulmonary veins communicate with those of the pleura. Valves are present in the deeper lymphatic system, which open toward the hilum, while those on the periphery drain toward the pleura. No lymphatics are found distal to the alveolar ductules.

The masses of lymphoid tissue in the lungs are important, for they are very often the starting point of tuberculosis. Nodes are found along the larger bronchi but not in the region of the respiratory bronchi or alveolar ductules; they are always found in the angle of dividing bronchi. Small masses of lymphoid tissue have been demonstrated in the walls of the veins, also in the angle at the junction of two veins; it has also been found in the pleura around the radicles of the pulmonary artery. It is without doubt true that the lymphoid tissue is the primary focus of infection in tuberculosis, the phagocytes having carried the bacilli to this region from the smaller air spaces.

Having a knowledge of the arrangement of the air spaces and knowing that the secondary lobules are separated from each other in well-defined areas, we can easily distinguish between the primary and the secondary lobules; you will readily see that this arrangement of pulmonary tissue under certain pathological conditions, more particularly tuberculosis, will occasion an increase of density on a roentgenogram which, if viewed from the proper angle, will be more or less triangular in shape. This is what is known as the "Dunham fan;" it will usually be found at the end of a trunk composed of a bronchiole, blood vessels, and lymphatic and connective tissue. The size of the fan is determined by the number of lobules involved. The type of pathology will also influence the character of the density for, should it be an advanced condition, we will have a diffuse density with fans showing here and there, many of them irregular in size and shape. Thus the characteristic marking of a plate of pulmonary tuberculosis consists of fan-shaped density with the apex toward the hilum, and the base toward the pleura, the apex being connected with the hilum by a heavy trunk. If we have two or more such areas of differing density, we will see the picture of tuberculosis, the greatest density indicating the oldest lesion. There may be great variation of density in the fan, varying from radiating lines (known as linear markings) to a heavy blotting-out effect. The most striking characteristic lies in the varying degree of change in the different trunk groups, for one trunk may be involved while the one next to it may be absolutely clear. It is very striking that in the early

adult cases the lesions are usually limited to the trunks of the upper lobes and more particularly the first interspace trunk.

In studying the linear markings of a given trunk, if we find that they are cottony or faintly obscured as by a cloud effect, and if the fan appears to be wide open, active tuberculosis must be considered. Should the linear markings be sharply defined, dense, and show sharp studding beyond the trunk, with the fan partially closed, a healed lesion is to be suspected.

Caseous bronchopneumonia gives us a picture showing a definite, heavy, flocculent density, usually in the more dependent portions of the lungs, and rarely in the apices. The fan previously described may or may not be seen; if the lesion is small and near the pleura, it is usually walled off by a heavy septum with flocculent densities beyond the trunk. If the lesion is large, it is frequently impossible to make out the borders of the triangles. With a condition such as this there is usually an old lesion at the apex, and frequently a cavity is seen.

The picture of miliary tuberculosis is very striking. The lung areas are spotted with fine, cottony granules of increased density, which may be discrete or confluent. These densities vary from the faintest shadow effects to brilliant discrete areas produced by calcification. The calcified areas are distinguished from those of anthracosis by the fact that the latter are usually more stellate, sharper, and thicker in character.

From what has been said you will readily appreciate that the Dunham fan, as it is called, plays a very important rôle in the roentgenological diagnosis of pulmonary tuberculosis, more particularly by the stereoscopic method. Before this was used, many early cases were overlooked.

## THE DISEASE-CARRIER PROBLEM IN THE PHILIPPINE ISLANDS

By Dr. CONCHA BRILLANTES

### INTRODUCTION

From the viewpoint of the epidemiologist, a carrier is of more concern than a frank case of a disease. This should be quite obvious; for the latter, being easily recognized, even by the laity, usually comes under official notice either through the report of a physician, a neighbor, or a member of the family, or comes to the attention of a house-to-house inspector. On the other hand, carriers may be recognized by a laboratory examination only. This is a task of some difficulty and not a little uncertainty, because the taking of specimens is subject to opposition on the part of the public, who consider the act a violation of their personal rights; besides which, they fear the hospitalization or sanitary isolation consequent on a positive finding. Furthermore, the person may be a real carrier, but the laboratory may fail to detect the organisms because of error in the taking or transportation of the specimen, delayed examination, etc.

A carrier is a hidden focus of infection for other persons and a menace to himself—a focus which, unless discovered by the laboratory, the sanitarian cannot control. His detection and control therefore constitute one of the most important problems in the suppression of disease in which carriers play a part.

So far as I have been able to ascertain, carriers were first discovered in connection with cholera. For some time Koch held the view that man is the "real bearer and reproducer of the cholera organism." Many isolated epidemics could be explained only on the assumption that completely healthy persons, or those not noticeably diseased, had introduced the organisms. This assumption was first confirmed by W. P. Dunbar in the winter epidemic in Hamburg in 1892-93 when, by the use of the peptone culture medium, he found the cholera vibrio in the stools of no less than twenty-eight healthy persons, who had never had cholera nor the slightest diarrhoea.

The object of this paper is to collect and set forth certain salient facts concerning carriers in order that they may be available for quick reference.

#### TYPHOID CARRIERS

The general belief that typhoid fever is not as common in the Tropics as in temperate climates has been found to hold true in the Philippines, according to the experience of the Bureau of Health. For several years (since 1900) it did not cause anxiety to the health officials because only sporadic cases occurred from time to time. Heiser in 1906-07, in view of Soper's investigations in New York and the occurrence of a preponderance of the cases among Americans and Japanese in the Philippines, announced the probability of the arrival of foreigners with infected gall bladders, or who at least would be discharging typhoid bacilli in their stools. During 1908-09 he warned against the possibility of the spread of typhoid through milk contaminated by infected water or by the hands of bacillus carriers, but added that this mode of spread may be disregarded since milk is not used on a large scale here.

During 1910-11 Fox emphasized the fact that it is the walking cases and the bacillus carriers that constitute the danger. Up to this time, however, laboratory confirmation was lacking.

In December, 1914, because of the increased prevalence of typhoid, a systematic examination of water, milk, and the faeces of persons working in dairies, restaurants, etc., was undertaken. As a result, thousands of faecal examinations were made but, fortunately, none of them proved positive for the bacillus. Similar negative results were obtained with drinking water and with milk.

In 1915 the experience of the previous year was repeated. Of the 411 specimens from contacts (covering the entire year) none was positive. In the survey for intestinal infection, out of 6,201 specimens examined, only 4 were positive for the typhoid bacillus.

In 1916 the board, appointed to investigate the causes of the persistence of typhoid in Manila, after a thorough study of the subject, arrived at the following conclusions:

1. That the Centro Escolar outbreak very probably had its origin in a carrier (a servant).
2. That paratyphoid is more prevalent than typhoid in Manila.
3. That persistence is due to contact infection from either

cases or carriers, and more often cases than carriers since, in spite of the extensive examinations made to detect the latter, very few have been found.

Experience with one case in Bilibid Prison, in 1917, would appear to indicate that the patient had been a carrier for more than four months before coming down with the disease.

The Philippine Health Service stated, in 1917, that antityphoid vaccination will not rid carriers of the bacilli. In connection with carriers, the Service made the following statements.

1. A positive Widal may indicate that a person has suffered a previous severe or mild form of typhoid; that he has received antityphoid vaccination; or that he is a "carrier" (commonly believed to have suffered from an unrecognized attack).

2. A positive Widal cannot be pronounced a "carrier" unless actual discharge of bacilli, by faeces or urine, is shown.

3. A typhoid carrier is not a danger to himself, but is such to unaffected people; therefore he should be debarred from places where food and drink are dispensed. For urinary carriers urotropin should be administered.

So far no work has been done on treatment of intestinal carriers.

In a survey (1917) of cases and contacts the following results were obtained: In the group of cases, recognized or suspected clinically, 62.98 per cent gave a positive Widal test, while for the contacts the percentage was only 9.21. Of great importance is the fact that out of the twenty-five faecal specimens from convalescents and other presumptive carriers, in only one was *Bacillus typhosus* demonstrated. One explanation offered for this encouragingly negative result was that possibly the vitality of the tropical strain of bacillus is shorter than has been observed in cold climates.

These findings therefore tend to show that there is hope of reducing the incidence of typhoid, and even of completely eradicating the disease.

#### DIPHTHERIA CARRIERS

In 1900 sporadic cases of diphtheria began to be reported in Manila. From one case reported in 1900 there was a gradual increase to eight in 1906, the mortality having always been 100 per cent. From fifteen cases in 1907 there was an increase to forty-nine in 1912, the mortality having relatively decreased. Cases, few in number, began to be reported from the provinces.

It was during 1911 and 1912 that the first diphtheria carriers were detected, twenty-four having been found. Examination was done, as customary, by the laboratory of the Bureau of Science, for the Bureau of Health. As the health officials looked upon these carriers as being more dangerous in the spread of infection than the frank cases of diphtheria, the former were all isolated and so kept until the bacilli disappeared as shown by two successive negative findings on separate days. In consequence of this discovery, and in order to combat the disease, specific instructions were issued to medical officers, one important feature of which was that relating to the detection and control of carriers. Worthy of mention is the fact that the longest time that bacilli have remained in the throats of diphtheria patients in San Lazaro Hospital was twenty-eight days from the time of disappearance of the symptoms. The longest time for a contact carrier to harbor the bacilli after admittance to the hospital was eighteen days.

From that time on, carriers have been continually detected in connection with the annual outbreaks of diphtheria.

The 1915 outbreak was attended by a high mortality and the occurrence of a large number of carriers from whom a high proportion, 35.71 per cent, of virulent cultures was isolated by the Bureau of Science. One important thing observed in this outbreak was the development of symptoms of diphtheria (fever, pharyngitis, etc.) in twenty-two, or 3.65 per cent, of the carriers after admission to the hospital. Prompt administration of serum prevented the further development of the disease and probably the death of the patients. The Health Service strongly suspected that the sporadic but constant appearance of cases might possibly be due to perpetuation of a certain strain through the agency of bacillus carriers.

In 1915 a survey of diphtheria carriers among exposed persons in households, schools, and other institutions revealed the existence of 9.64 per cent of diphtheria carriers, which is excessive as compared with 3 per cent reported for some parts of the United States. This signifies: (1) perpetuation of a certain strain in Manila by uncontrolled carriers; or (2) an indication of an actual or closely threatening epidemic. The development of symptoms in some carriers was explained by the possibility of increase in virulence of harmless bacilli in carriers.

In 1916 the diphtheria outbreak showed a marked improve-

ment from the epidemiological standpoint, because there was a marked reduction in:

Percentage of positives out of all cases reported.

Percentage of mortality of positive cases.

Percentage of positive carriers.

Virulence of local strains of diphtheria bacillus (cases and carriers).

These results are evidently due, if not entirely at least largely, to the antidiphtheria campaign undertaken in the previous year.

During 1917 and 1918 there was a continuous reduction in incidence of both cases and carriers, but the mortality rate increased. Although this comparatively high mortality is puzzling the Health Service, yet, so far, not enough research has been done to find an explanation for it.

#### CHOLERA CARRIERS

For quite a long time the frequent reappearance of cholera in the Philippines has puzzled the health authorities; so much so, that on February 28, 1908, Heiser, then Director of Health, announced his hypothesis concerning this frequent reappearance; namely, that the cholera vibrio remains in the sewer system (the old Spanish sewers provided for storm water) and by contamination of water and food gets into the human intestine. He therefore advocated a thorough disinfection of these sewers. In view of recently acquired knowledge, this assumption may very well be disregarded. It was Marshall who, on the same date, first noticed the presence of cholera vibrios in stools of convalescents from cholera: in one case for four days and in another for ten days, when the patient left the hospital and was lost sight of. He emphasized the importance of this occurrence in its bearing upon the spread of the disease.

McLaughlin on October 19, 1908, however, was the first to draw attention to the existence of cholera-vibrio carriers. The discovery was made in connection with the outbreak in Bilibid Prison, when he ordered stool examinations to be made of persons who had to do with the preparation and handling of food and drink. Several healthy persons in this group gave positive findings for cholera vibrios; but upon compliance with his orders to wash and disinfect the hands (in a disinfecting solution), after stool and before eating, no more cases appeared in spite of the presence of carriers. Examination of apparently healthy persons in Meisic and Tondo shortly after showed 7 per cent of them to be bacillus carriers. He then stated that the existence of carriers, together with bad closet facilities and

the failure to report cases early, were the factors that, more than any others, operated to make cholera suppression difficult. McLaughlin concluded from his experience in these outbreaks that the most important rôle in the transmission was played by the carriers. As a result of this important discovery, it has been suspected that possibly some carriers were introduced from near-by foreign countries, and since then the routine practice of examining the stools of all steerage passengers from cholera-infected districts was followed; at the same time the examination of the faeces of all suspects, and of all persons engaged in handling food for public consumption, became also a routine practice. All carriers were sent to San Lazaro Hospital, and there detained until the vibrios disappeared from their stools.

In July, 1911, seven contacts of a positive case proved to be carriers, but none of them developed cholera. All of these were retained till the vibrios disappeared, and no more cases developed. One carrier was discovered in a Chinese immigrant from Canton. Hence the possibility that some outbreaks were caused by carriers from abroad was considered.

In August, 1913, there was another outbreak of cholera, the first cases occurring in widely separated places with apparently no connection between them. All carriers found were isolated in cholera hospitals or other quarters, and the outbreak was suppressed.

In the same way the 1914 outbreak was suppressed by the isolation of cases and carriers. The disease seemed not to have been introduced from foreign countries, since no carriers were detected during the quarantine period. That year the cholera-carrier survey was more extensive, including the personnel of all establishments selling food, and remote contacts, such as persons living in the same block where a suspected case or a positive carrier was found. As a result it was found that out of 37,160 specimens, 530, or 1.42 per cent, were carriers. One important discovery took place in Bilibid Prison where out of 179 carriers, 5 developed the symptoms of cholera from four to eighteen days after having been found positive for the vibrios.

In 1914 carriers were also detected in the bodies of those dead of other diseases, such as enteritis, diarrhoea, dysentery, infantile beriberi, pulmonary tuberculosis, and intestinal tuberculosis. These findings led Munson to the belief that possibly any intestinal disorder materially predisposes to the development of cholera infection if the latter gains access to the alimentary tract.

Munson, in 1914, mentions the occurrence of a number of intermittent carriers in Bilibid Prison, one of them for over seven weeks. In the same institution an individual, after having been a case in 1913, was found to be a carrier in 1914. It therefore remained to determine the limit of the viability of the vibrio in the intestine. The possibility of these individuals having harbored the vibrios for the whole time (one of them over a year) and being representative of persons responsible for the annual outbreaks, was recognized. Treatment with salol was apparently of little value, since some carriers receiving it for some time developed the disease, and one of them even died.

In 1915 Schöbl reported the examination of thirty-nine gall bladders, seventeen of which were positive for vibrios while the intestines of the same cases were all positive. All of the forty-one specimens of urine from patients and convalescents were negative, while the faeces from the same were positive.

A little later the same author succeeded in producing carriers among guinea pigs by inoculation of living cultures of cholera vibrios into the gall bladder, stomach, small intestines, and serous cavity, and by feeding, although the duration of this state was limited to fourteen days. He also determined that in these experimental cholera carriers there was an infection of the gall bladder caused by the injected cholera vibrios, the latter therefore not only surviving there as mere saprophytes. He also found that infection may extend to the liver. Cholera vibrios were absent from the blood, lungs, and spleen; hence the improbable septicæmic character of the infection. The excretion of vibrios was irregular, so we see that this corresponds to the occurrence of intermittent human carriers.

Coulter in 1915, and Crowell and Johnston in 1917, also found gall-bladder infections in connection with cholera carriers, as well as the presence of cholera vibrios in the bile. As compared with the results of the cholera-carrier survey in 1914 there was observed in 1915 a marked decrease, the incidence being only 0.41 per cent (1.42 per cent in 1914).

Long, in 1916, stated that it has been demonstrated pretty conclusively that when a cholera carrier is given a severe purge, or when he (the carrier) ingests food or other substances which have the effect of producing a severe purge, the carrier frequently is converted into an actual case.

A suggestion of this developed in a recrudescence of the cholera outbreak of that year, which came in November and December. It developed, on investigation, that at this time

Manila Bay was invaded by swarms of a flagellated protozoön of the family Peridinidæ and that, as a result, large numbers of fish and crustacea were killed. These were gathered up by local fishermen, their capture being easy, and sold to the poorer people. Much of this food was already decomposing and as a result there was soon a rather extensive outbreak of intestinal disorder.

It was not definitely determined at this time whether the illness was of the nature of food poisoning or whether a proportion of the cases represented true cholera. Undoubtedly, many of these cases were cholera, and it might be assumed that these represented carriers in which the infective germs had been called into activity as a result of the gastrointestinal irritation produced by the ingestion of the partially decomposed sea food. In passing, it must be remarked, however, that the cholera epidemic was on the decline when this happened; secondly, a very small proportion of the cases were bacteriologically positive for the vibrio and, lastly, the mortality was far below that of the minimum mortality in cholera.

Johnston, from September, 1914, to December, 1917, noticed the occurrence of intermittent carriers as well as of nonagglutinable vibrios. These findings made it the more difficult to determine the duration of the carrier state.

Schöbl, in 1916, demonstrated that administration of bile to experimental cholera carriers prolonged the carrier state and caused a more frequent excretion of vibrios than in normal carriers. This evidently is a great help in the detection of normal carriers. He also found specific immune bodies in the blood serum of experimental carriers.

The same author, in 1917, found some chemicals which produced slight curative effects upon experimental vibrio carriers, among them being guaiacol, pyrogallol, atoxyl, sodium cacodylate, arsenic trioxide, and Ehrlich-Hata 606. These experiments are by no means final; still they yield some hope for the treatment of carriers. The phenol group and some of the arsenic compounds are of some promise. Combination treatment by several drugs also suggests itself.

In 1917 the Health Service paid more attention to the occurrence of nonagglutinable vibrios and after a study of the question came to these provisional conclusions:

1. That atypical cases with marked symptoms may coincide with the presence of nonagglutinable vibrios and the absence of the classic agglutinable ones.

2. That, in a number of cases and carriers, the preexisting vibrios (either agglutinable or nonagglutinable) may change into the opposite and that, hence, it is unwise in any anticholera campaign to disregard the existence of nonagglutinable vibrios.

#### BACILLARY DYSENTERY CARRIERS

In connection with bacillary dysentery carriers the literature is very scant. In 1914 the Bureau of Health stated that the Igorrots were frequently afflicted with, or had among them carriers of, bacillary dysentery. There is, however, nothing mentioned in connection with any definite examination to detect this condition.

#### CONCLUSIONS

1. Carriers of typhoid, cholera, and diphtheria have been definitely proven to occur in the Philippines, but so far the greatest amount of research has been done in connection with cholera-vibrio carriers.
2. Carriers apparently do not play an appreciable part in the spread of typhoid fever, at least in Manila.
3. Carriers of the diphtheria and cholera bacilli, on the other hand, do play an important rôle in the dissemination of these diseases and constitute the main factors in the annual outbreaks that have been observed.

## AUTOINFECTION, SO-CALLED, DURING THE PUERPERIUM

By Dr. G. RUSTIA

Puerperal infection has been known as a morbid entity since the early history of medicine. It has been the subject of many investigations through all ages. Denmann (1788) was the first to observe that the disease was transmitted from cases of puerperal fever to healthy puerperal women by physicians and midwives. This view was strongly supported by Alexander Gordon, of Aberdeen, in 1795, and by Oliver Wendell Holmes, of America, in 1843. Gordon showed the infective nature of the disease, and Holmes showed the evidence that it was carried from patient to patient. The last named was confident that it could be conveyed in a similar way from a case of erysipelas, or from a postmortem, and that it was necessary for the physician to disinfect his hands and to change his clothes after attending a case of puerperal infection. This work was put upon a sound basis by Semmelweiss of the Lying-In Hospital of Vienna, who came to the conclusion from his brilliant researches that the introduction of "cadaveric poison" was the main cause of puerperal infection. The introduction by him of the use of chlorine water and solution of chloride of lime for cleansing the hands of the students and nurses attending labor cases reduced the mortality rate to 1.27 per cent in 1848. His theories were first ridiculed by his colleagues of that time, but were finally recognized when Pasteur discovered in 1878-79 the streptococcus in the uterine discharge, blood, and tissues (postmortem) of puerperal fever patients. They thus recognized external infection.

Leading obstetricians confirmed the finding of Pasteur, and it is a well-known fact to-day that the streptococcus in many instances is the sole cause of this disease. But years after the discovery of Pasteur, the streptococcus was found to harbor normally in the genital canal of healthy parturient women, as shown by Doderlein, Bumm, Walton and Medalia, and others.

The question now arises: Is this organism, found in healthy parturient women, the same that causes puerperal infection?

In other words, is so-called autoinfection during puerperium possible?

Kaltenbach, in 1888, admits the possibility of autoinfection in the following sentence of his communication to the German Gynecological Society:

It is possible that pathogenic organisms may harbor in the genital tract during pregnancy without giving rise to any symptoms and only exert their influence during labor or the puerperium when the wounds following delivery will afford opportunity for their growth and absorption. Of course, in the strict sense of the words, this is not autoinfection, but merely a variety of external infection, the only difference from the usual form of contact infection being the length of time that the offending microorganisms have been in the genital tract. Thus, admitting that the vagina may contain pathogenic organisms, it is admissible that they may lead to infection without any further introduction of organisms from without.

The possibility of autoinfection, therefore, must stand or fall by the demonstration of pathogenic organisms within the genital tract of pregnant, parturient, or puerperal women who have not been examined previously.

The streptococcus group, because of their well-known importance in puerperal infection, have interested many in the study of vaginal bacteriology during the later weeks of pregnancy. Doderlein in his study of one hundred ninety-five cases distinguished two varieties of vaginal secretion; namely, normal and pathological. In the normal vaginal secretion he found a facultative anaërobic bacillus in frequent association with a type of blastomycetes which he believed to be *Saccharomyces albicans*. This bacillus which bears his name was found to be nonpathogenic. He accordingly concluded that the normal secretion presents no possibility for autoinfection, because of being bactericidal to pus-producing organisms. On the other hand, he found pathogenic streptococci in 10 per cent of the pathological vaginal secretions. This pathological secretion may afford then an opportunity for autoinfection, because of the possibility of the presence of a streptococcus which was pathogenic in more than half of his cases. Joeten, in 1912, reported one hundred antepartum cultures with streptococci in sixty-seven; fourteen of these were hemolytic, but evidence of the pathogenicity of these bacteria was wanting. Walton and Medalia (1912) found streptococci present in the vagina of pregnant women in from 10 to 40 per cent. They worked on the hemolytic and nonhemolytic form without, however, differentiating them further. In the one hundred three cases which they studied, antepartum and postpartum, the only two cases with morbid

temperature out of the nine with hemolytic streptococcus postpartum had streptococci antepartum; one of these was found distinctly hemolytic antepartum while the other was not tested for hemolysis. Similarly, they found two out of four cases with morbid temperature due to nonhemolytic streptococci postpartum which had the same microorganisms antepartum. Permar (1916), writing on the bacterial flora in later pregnancy, apparently recognized puerperal infection carriers. He states:

The presence in the vagina of streptococci giving the carbohydrate reaction of virulent organisms as well as those of less virulent character, but corresponding to forms recognized as having definitely invasive qualities is comparable to that recognized in the other cavities in which virulent or apparently virulent organisms are constantly present without giving rise to disease processes.

Bumm claimed to have found streptococcus in 50 per cent of normal, pregnant women, and that 75 per cent of healthy puerperal women were carriers of streptococcus. In his communication to the Tenth German Gynecological meeting, at Wurzburg in 1903, he says:

The great problem is this: Are the streptococci which we find regularly in the majority of cases of all pregnant and parturient women identical with the streptococcus found in septic wound infection only existing in a temporarily avirulent stage; and have they nothing at all in common with the streptococci causing septic infection except only in outside similarity in form belonging altogether to another harmless type of organism? I believe that at this stage all the future bacteriologic researches will have to be applied towards the differentiation of the various types of streptococci found. That streptococci are present in the genitalia can not be doubted to-day. The question to be studied now is the relation of such to the quality of the streptococci derived from sepsis.

This problem laid down by Bumm has been the subject of many investigations.

Various classifications of streptococcus were made and several varieties of streptococci were observed in the numerous pathologic processes; but, while the bacteriologist has largely used the carbohydrate fermentation tests, the medical man has observed the hemolytic character, so that the results of these scientists cannot be compared. In recent years, the majority of authors who have used the blood agar plate method as a means of primary classification of streptococci into hemolytic and nonhemolytic strains have further extended the classification of streptococci already grouped on the basis of fermentation tests. In fact, the consensus to-day is that the most satisfactory classification of streptococci for practical purposes is that of Holman, which consists in a primary differentiation of

hemolytic and nonhemolytic strains by the superficial streak method on blood agar plate followed by differentiation by the use of sugar media: lactose, mannite, and salicin.

To simplify our work we followed the last-mentioned classification. I will give now a preliminary report of the results of our investigation and will reserve the technical part of the work for a later publication when I hope to be able to report the results of investigations covering a greater number of cases than at present. We made bacteriological examination of the secretion from the cervix uteri and posterior cul-de-sac in every patient, before and after delivery. Doderlein's classification of vaginal secretion was not made. In a series of eighty cases examined, antepartum and postpartum, the results are as follows:

*Bacterial findings in the eighty cases examined antepartum.*

	Cases.
Hemolytic streptococcus	15
Nonhemolytic streptococcus	3
Bacteria other than streptococcus	53
Sterile	9

*Results as to distribution of bacteria in the eighty cases examined antepartum.*

Cervix:	Cases.
Hemolytic streptococcus	12
Nonhemolytic streptococcus	3
Bacteria other than streptococcus	39
Sterile	26
Vagina (posterior cul-de-sac):	
Hemolytic streptococcus	15
Nonhemolytic streptococcus	3
Bacteria other than streptococcus	53
Sterile	9

*Bacterial findings in the same eighty cases postpartum.*

	Cases.
Hemolytic streptococcus	20
Nonhemolytic streptococcus	10
Bacteria other than streptococcus	47
Sterile	3

*Results as to distribution of bacteria in the same eighty cases postpartum.*

Cervix:	Cases.
Hemolytic streptococcus	13
Nonhemolytic streptococcus	9
Bacteria other than streptococcus	32
Sterile	26
Vagina (posterior cul-de-sac):	
Hemolytic streptococcus	20
Nonhemolytic streptococcus	10
Bacteria other than streptococcus	47
Sterile	3

Among the fifteen strains of hemolytic streptococcus found antepartum and differentiated further by means of carbohydrate fermentation, eleven were shown to be *Streptococcus pyogenes*, according to Holman's classification. Of these eleven, four had caused infection during the puerperium, two of which were recovered in pure culture, and the other two were associated with *Staphylococcus aureus*. Of the three nonhemolytic streptococci isolated antepartum, one was found to cause fever during the puerperium.

These facts seem to show beyond doubt that autoinfection plays an important rôle in the causation of puerperal infection, whether due to hemolytic or to nonhemolytic streptococcus.

#### CONCLUSIONS

1. Healthy pregnant, parturient, and puerperal women who have not been previously examined may normally harbor pathogenic streptococci in the genital canal.
2. The so-called autoinfection does really exist, but it should not be emphasized to such an extent as to impair the importance of aseptic and antiseptic procedures in handling obstetrical cases.

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## PATHOLOGICAL FINDINGS IN THREE CASES OF ENCEPHALITIS LETHARGICA

By Dr. W. DE LEON

Previous to the recognition of encephalitis lethargica as a distinct entity there were published in many European journals, chiefly British and French, reports of cases of a peculiar derangement of the central nervous system, mostly manifesting itself in queer mental torpidity, lethargy, at times unconsciousness, and irritation of cranial nerves.

Due to the similarity of symptoms, the British authors at first thought this mysterious disease to be identical with botulism. Other writers described the disease under basal leptomeningitis, toxic ophthalmoplegia, epidemic polioencephalitis, and encephalomyelitis, depending upon the site of the irritation in the nervous system. Those who have had opportunity to perform postmortem examination of cases dying of this affection could find no definite gross anatomical lesions to account for death.

About the latter part of 1919, and after the great epidemic of influenza which swept over these Islands, we used to meet cases at the autopsy table, from the Philippine General Hospital, with clinical evidence of nervous involvement, in which after examination we failed to find any corresponding gross anatomic lesions.

Such was the fact with a body that was transferred to the morgue with the clinical diagnosis of typhoid with signs of meningismus during life. At autopsy, all the organs were negative except for the presence of marked passive congestion of all the viscera, and some edema and injection of the mucosa of the intestines. There were absolutely no typhoid lesions in the gut. The brain, however, was not examined.

It was then suggested by Doctor Wade that a careful, thorough, and minute inspection of the brain be made of those cases that gave history of disturbance of the central or peripheral nervous system, especially when no gross anatomical manifestation to explain death was found. To him also belonged the privilege of

examining at autopsy the first case of those that I am to report to-day.

This was a male of 47 years, who died after a 10-day stay in the hospital. The clinical diagnosis was meningitis and acute nephritis. Autopsy was performed sixteen hours after death. The body was well developed and poorly nourished.

The lungs were congested and showed areas of ecchymosis posteriorly, with here and there irregular patches of consolidation. The bronchi were congested and contained purulent exudate.

The brain showed nothing of interest except a marked injection of the larger and smaller vessels over the entire surface. The heart showed slight enlargement and some myocardial degeneration. There was slight chronic nephritis. The aorta was slightly atheromatous. The rest of the viscera showed marked congestion.

Anatomical diagnosis: Influenza; acute, purulent bronchitis; early bronchopneumonia; acute myocardial degeneration; dilatation of the heart; acute and chronic nephritis; congestion of the brain; moderate chronic splenitis; moderate arteriosclerosis. Cultures from the lungs were negative for influenza bacillus, and positive for a nonhemolizing streptococcus and for a diphtheroid.

Histologically, sections from the different places of the cerebral cortex passing through the internal capsules, the basal ganglia, and the peduncle showed marked engorgement of the cerebral capillaries. In a few there were found hyaline thrombi that contained polymorphonuclears. Hemorrhages into the perivascular spaces were met with and many of the vessels were markedly infiltrated at the periphery and in the adventitia with small mononuclear cells, one, two, or three layers deep. It is not very unusual to find a slight amount of serous exudate, or delicate fibrils of fibrin around the blood vessels among which are seen the layers of infiltrating round cells. It is common also to see a layer of these white cells laid along the intima of the vessels. Not only are the perivascular spaces infiltrated, but in places, especially in those portions of the cerebral ganglia where the vessels show prominent changes, the surrounding nervous tissue as well is slightly diffusely infiltrated with round cells; at least these tissues look peculiarly different in being more cellular than portions not so infiltrated.

In sections of the spinal cord the meningeal vessels appeared engorged and the meninges showed slight, diffuse,

small, mononuclear infiltration. Both the anterior and the posterior cornua were affected, where most of the vessels are engorged and profusely infiltrated peripherally. In these regions the nerve cells did not appear to be normal; most of them were pale, not taking the stain properly. The tigroid granules were irregular in size and distribution, having lost their concentric arrangement around the nucleus.

The lung showed bronchopneumonic consolidations, hemorrhagic, with no fibrin in the exudate but wholly polymorphonuclear, and large desquamated vacuolated cells. In many alveoli purely red cells were found. There was also purulent bronchitis. The heart showed injection of the capillaries, intrafascicular and interfibrillar hemorrhages with myocardial degeneration. The findings in other organs were of congestion and a chronic inflammatory condition.

There was marked engorgement of the vessels of the pancreas and the adrenals. There was slight acute hemorrhagic tubuloglomerular nephritis with slight thickening of the media of the vessels. The spleen showed intense injection with minute interstitial hemorrhages, diminished pulp, atrophied malpighian corpuscles, and thick-walled vessels with hyaline degeneration. The liver showed moderate passive congestion, organizing focal degenerations with marked dilation and engorgement of the vessels and the sinusoids.

In view of the histological examination the pathological diagnosis of this case has been revised to include encephalitis lethargica.

The second case was a male Filipino, 17 years, who died after a 25-day stay in the hospital, with a clinical diagnosis of tuberculous meningitis (?). Autopsy performed four hours after death gave the following anatomical diagnosis: Encephalitis lethargica (?); congestion of all the viscera, marked; parenchymatous degeneration of liver and kidney, slight. Body, emaciated, presenting all the external evidences of an attack of a severe disease but, except for the marked passive congestion of, and the finding of petechial hemorrhages in, the viscera, together with capillary hemorrhages in the brain, the anatomical findings are absolutely negative.

Microscopically, sections of the brain presented the same marked engorgement of the vessels with distinct perivascular infiltration of small mononuclears and spilling of red cells into the perivascular spaces. In some of the vessels distinct rupture of the walls can be seen and the hemorrhages from them look

irregular and more interstitial. Usually a portion of the wall was still preserved, in a few the wall was completely absent. The perivascularly infiltrating cells have maintained their relative position and indicate the boundaries or site of disappeared vessel walls. Here and there were minute, diffuse, irregular, interstitial hemorrhages. In most sections the extravascular blood was seen as minute dissecting hemorrhages about the intact vessels, which had evidently ruptured at some other level. Among these infiltrating cells there were occasionally present a few of the large mononuclear type. Hyaline thrombi were also seen. The spinal cord in this case showed no microscopic lesion.

There was much engorgement of the capillaries and vessels of all the viscera. In the lungs the alveoli were filled with red blood corpuscles in certain places. In the heart there were hemorrhages between the fibers. Anaërobic cultures from the brain and cord of these were made with negative results. Subdural injection of filtered and unfiltered emulsions from the brain, cord, and pharyngeal scrapings of these gave negative result. It may be of interest, particularly in view of reports of successful transmission of the infection to monkeys elsewhere, that the monkeys used here had been immunized with the so-called *Bacillus influenzae* several months previously.

The third case came to the morgue with the clinical diagnosis of malaria, cerebral type, after staying in the hospital for fifteen days. Autopsy was performed by Doctor Wade, seven hours after death. Gross examination of the body revealed little to indicate the immediate cause of death. There was visceral congestion with superficial hemorrhages in the right lung and perivascular hemorrhages in the brain. Heart showed myocardial degeneration and dilatation. Because of these findings and our previous experience, a diagnosis of encephalitis lethargica was made.

Microscopically, as in the previous cases, there were found general marked vascular engorgement and, in the lungs, hemorrhages into the alveoli.

Sections of the brain at different levels presented the same microscopical picture as in the first case, except that engorgement, hemorrhages, and infiltration here appeared more intense.

The spinal cord, as in the first case, was affected and with considerable severity. The other viscera showed infection and slight degeneration.

In the kidneys there was marked tubular degeneration and

slight epithelial desquamation with intratubular and intertubular hemorrhages, with enlargement of the alveoli, distension of the capsular space with serum, injection of the tuft, and slight mononuclear infiltration. Pancreas, spleen, and liver showed the same high degree of injection with widening of the sinusoids of the latter and slight degeneration of the parenchyma.

It is evident from the protocols of these three cases that the predominant picture in the pathology of this disease as represented by these cases is, essentially, marked visceral congestion and, histologically, minute capillary engorgement and hemorrhages of the brain and cord with distinct perivascular infiltration of small lymphocytes and occasionally some large mononuclears. In one of these cases there is, histologically, bronchopneumonia secondary to bronchitis, probably terminal in character, which does not much influence the clinical course of the disease, as it was not even noted on physical examination and in the clinical diagnosis. These vascular lesions may affect the whole extent of the nervous system or may localize and predominate in any portion of the brain or in the cord; for example, in the third case there is involvement both of the brain and of the cord simultaneously, with apparently the same intensity. The first, while affecting both structures, showed more profound changes in the brain. The second case, however, did not extend to the cord and, due to the fact that many of the brain sections in this case were negative, the lesions must have been only localized in a certain region, apparently in the region of the basal ganglia. In this connection it may be interesting to analyze some of the reports of other workers in different portions of the world.

Wegeforth and Ayer<sup>(1)</sup> noted slight evidences in the cord of the cases they examined, but laid emphasis upon histological findings in sections of the brain; and Breinl,<sup>(2)</sup> of Australia, noting symptoms mostly referable to, and the pathological changes being mainly in, the cord, calls this mysterious disease "a clinically atypical form of Polyomyelitis."

On the other hand, Cleland,<sup>(3)</sup> also working in Australia, in his studies of an epidemic with marked cerebrospinal symptoms found the lesions much like those of cases 1 and 3, in which the brain and spinal cord were both heavily involved, and designated the disease "Epidemic Acute Encephalomyelitis."

He is of the opinion that the virus of that particular epidemic which was successfully transmitted, and which reproduced lesions in monkeys, horses, and calf, may be a "mutant" of the virus that causes polyomyelitis and encephalitis lethargica.

Bassoe,(4) of Chicago, described a series in which the engorgement and perivascular infiltration were more localized and pronounced at the midbrain. Flexner(5) also found considerable involvement of the cord and brain.

It is scarcely necessary to remark that the microscopical findings of these and other workers are similar to our observations.

I am sorry that I cannot orientate from what definite portions of the brain each section was cut, but we always take sections of the different portions, including that of the basal ganglia and the peduncle.

It would seem then that, depending upon the portion of the brain or cord involved, the symptoms will vary and that the diagnosis will be a difficult matter clinically unless the disease appears in epidemic forms as it has lately done in other countries.

Just to illustrate this diagnostic difficulty for the clinician and even for the pathologist at the autopsy table, I will cite that during the short period following the discovery of its presence here we examined in all eight cases with which the connection of the diagnosis of encephalitis lethargica has been made, either clinically, at the time of autopsy, or later on histological examination.

The three cases here reported are included in these eight and, as you have heard, two of these three bore the clinical diagnosis of tuberculous meningitis, and one of the cerebral type of malaria. The first of the cases was diagnosed influenza at the table and subsequently found to be encephalitis on histological examination. The other two were diagnosed encephalitis with question mark, anatomically, but corroborated later microscopically. Three cases bore as one of the principal clinical diagnoses encephalitis lethargica, two of which turned out to be typhoid, and one tuberculous meningitis. Two of these were also provisionally diagnosed encephalitis anatomically, for possible association with other conditions found, but resulted negative microscopically.

Two others were diagnosed at the table probable encephalitis along with the other conditions present, on account of capillary congestion in the brain, but resulted negative histologically.

I presume that clinical diagnosis of isolated cases here, for reasons that are evident especially in this country and as borne out by an analysis of the diagnoses in this small series, will be doubly difficult due to the frequency of tuberculous meningitis, especially in children.

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